Hitchcock
8 M. L.

SYSTEMATIC INVESTIGATIONS AND BIBLIOGRAPHY

ADVERTISEMENT.

The United States National Herbarium, which was founded by the Smithsonian Institution, was transferred in the year 1868 to the Department of Agriculture, and continued to be maintained by that department until July 1, 1896, when it was returned to the official custody of the Smithsonian Institution. The Department of Agriculture, however, continued to publish the series of botanical reports entitled "Contributions from the United States National Herbarium," begun in the year 1890, until, on July 1, 1902, the National Museum, in pursuance of an act of Congress, assumed responsibility for the publication. The first seven volumes of the series were issued by the Department of Agriculture.

RICHARD RATHBUN,
Assistant Secretary, Smithsonian Institution,
in charge of the United States National Museum.

A. S. Hitchcock
Dec. 1910

SMITHSONIAN INSTITUTION

UNITED STATES NATIONAL MUSEUM

CONTRIBUTIONS

FROM THE

UNITED STATES NATIONAL HERBARIUM

VOLUME XII

SYSTEMATIC INVESTIGATIONS

AND

BIBLIOGRAPHY

WASHINGTON

GOVERNMENT PRINTING OFFICE

1908–1909

NOTE.

The ten parts of Volume XII of the Contributions were issued as follows:

Part 1, pages 1 to 94, April 23, 1908.
Part 2, pages 95 to 112, May 20, 1908.
Part 3, pages 113 to 158, June 18, 1908.
Part 4, pages 159 to 170, October 6, 1908.
Part 5, pages 171 to 182, January 27, 1909.
Part 6, pages 183 to 258, March 23, 1909.
Part 7, pages 259 to 302, April 12, 1909.
Part 8, pages 303 to 390, April 23, 1909.
Part 9, pages 391 to 412, May 10, 1909.
Part 10, pages 413 to 456, July 21, 1909.

PREFACE.

The present volume of the Contributions from the United States National Herbarium is made up of ten originally separate parts, comprising twenty-five papers in all.

The first part consists of a catalogue of the botanical library of John Donnell Smith, presented by him in 1905, together with his herbarium of more than 100,000 specimens, to the Smithsonian Institution. The library contains some 1,600 bound volumes, consisting chiefly of works relative to systematic botany, and being especially rich in works relating to Mexico and Central America. For the present, the library is to remain in Baltimore, but Captain Smith has placed his books freely at the disposal of botanists.

Not only have the books been selected with great care, but they are all in conspicuously handsome bindings. It is doubtful if there is any public or private botanical library of its size which can equal it in value from either the scientific or the artistic point of view. A simple but appropriate book plate has been designed and printed and placed in each volume.

It is believed that the catalogue will be of interest and practical value to many botanists. It is the work of Alice Cary Atwood, cataloguer in the office of the botanist, Department of Agriculture. The arrangement is by authors.

The second part comprises three short papers, the first two by Mr. Henry Pittier. From 1887 to 1903 Mr. Pittier resided in Central America, devoting a large part of his time to the study of its flora. He made extensive collections and published various botanical papers. Since coming to Washington, in 1903, Mr. Pittier has continued his study of this flora, and in the two short papers herein offered he presents some of the results.

The third paper is a report by Mr. J. R. Johnston, of the Department of Agriculture, upon a collection of plants obtained by Capt. Wirt Robinson and Dr. M. W. Lyon, jr., in Venezuela. Mr. Johnston was asked to determine these species because he had himself collected in that country and was somewhat familiar with its flora. The collection, though a small one, proves to contain five new species, and this paper, like many others in the Contributions, emphasizes the richness of the tropical American flora.

The third part embodies the results of an investigation by Prof. A. S. Hitchcock, Systematic Agrostologist of the United States Department of Agriculture, under the title, "Types of American grasses: a study of the American species of grasses described by Linnæus, Gronovius, Sloane, Swartz, and Michaux."

This paper is an important contribution to our knowledge of American grasses, from the nomenclatorial point of view. It is regarded as practically a necessity in the critical systematic investigation of any group of plants that the identity of the species described by earlier authors be determined with certainty. Often this identification can be made only by examining the type specimen, the original description being inconclusive. Under the American code of botanical nomenclature,[a] which has been followed by the author of this paper, "the nomenclatorial type of a species or subspecies is the specimen to which the describer originally applied the name in publication."

The procedure indicated by the American code, namely, to appeal to the type specimen when the original description is insufficient to identify the species, has been much misunderstood by European botanists. It has been taken to mean, in the case of the Linnæan herbarium, for example, that a specimen in that herbarium bearing the same name as a species described by Linnæus in his Species Plantarum must be taken as the type of that species regardless of all other considerations. In point of fact, the specimen preserved in the herbarium of Linnæus is often not the type specimen of the species whose name it bears. Linnæus sometimes based a species on the figure and description of an older author, but by mistake placed in his herbarium a specimen belonging to a similar but distinct species. He sometimes failed to preserve the specimen on which one of his species was based, but later preserved some other specimen incorrectly referred to the species. To consider such specimens types would be quite contrary to the letter and the intent of the American code.

An examination of the methods pursued by Professor Hitchcock in locating and identifying the type specimens of American grasses in European herbaria is earnestly commended to those botanists who are not familiar with the method of types or who are opposed to its application.

Opportunity was kindly given by various curators for the examination of specimens. Acknowledgment is made, however, to B. Daydon Jackson, Carl A. M. Lindman, P. H. Lecomte, and A. B. Rendle for special courtesies and assistance rendered by them in facilitating the examination of collections in their charge.

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[a] Printed in Bull. Torr. Club **34**: 167–178. 1907.

The fourth part consists of a paper by Mr. Henry Pittier on "The Mexican and Central American Species of Sapium."

During the past few years much study has been bestowed upon plants which furnish the rubber of commerce. This has shown that many of these are unknown botanically, that those which have been described have often been placed in wrong genera, and that the number of genera and species which may furnish rubber is likely to prove much larger than has been supposed. It has been discovered not only that several species of the genus Sapium produce a part of the rubber of commerce, but that the genus is a very large one, and it will doubtless be found that more of its species are capable of yielding a satisfactory raw product.

Mr. Pittier's paper on the species of Sapium of Mexico and Central America is therefore, in view of the growing demand for rubber, timely, and the contents are such as to make it an important contribution to this subject. Most of the new species here proposed were first studied by Prof. Karl Schumann, but his death occurred before they had been published, or even manuscript upon them prepared. Mr. Pittier has described the new species recognized by Professor Schumann, together with two additional species distinguished by himself, and has added, with appropriate notes, descriptions of two already known.

Part 5 consists of a paper, also by Mr. Pittier, on "New and Noteworthy Plants of Colombia and Central America." The plants considered were selected from several collections which have recently come into the possession of the United States National Museum. These collections form a most valuable addition to the herbarium, and their richness in new and rare species emphasizes the need of still further field work in tropical America and the more extensive study of the plants already collected.

A second paper by A. S. Hitchcock, entitled "Catalogue of the Grasses of Cuba," forms part 6 and is the result of an exhaustive study of the material in the United States National Herbarium and in the herbarium of the Estación Central Agronómica de Cuba. It was chiefly through the efforts of Mr. Carl F. Baker, who obtained large collections in Cuba, that the specimens were made accessible to Mr. Hitchcock. It is hoped that this paper will be followed by similar ones upon other groups.

In part 7 Dr. J. N. Rose continues his "Studies of Mexican and Central American Plants." This report varies little in style and treatment from the five numbers which have already been published. They all emphasize the botanical richness of the countries south of the United States, and the importance of careful work by experienced collectors.

Part 8 is occupied by a paper entitled "The Allionaceae of the United States, with Notes on Mexican Species," by Paul C. Standley, now Assistant Curator in the Division of Plants, National Museum. This was elaborated under the direction of Prof. E. O. Wooton, of the Agricultural College of New Mexico, while Mr. Standley was assistant professor in that institution. It embodies the results both of field work and of a study of herbarium material from most of the western herbaria, as well as the National Herbarium, and of all the literature of the subject. Mr. Standley has aimed at a comprehensive and thorough treatment of the whole group, and has found it necessary to establish several new genera and restore others not recently accepted. The number of sheets studied belonging to the National Herbarium was 1,068. Of the 50 new species here described the types of 20 are in the National Herbarium, and others are represented here by duplicate types. The illustrations, except Plates XXXIV and XXXV, are from drawings made by Mr. Standley himself.

The ninth part contains eleven short papers upon new or noteworthy plants. Of these the first ten, one by N. L. Britton and J. N. Rose, the others by J. N. Rose, relate to North American plants, chiefly Cactaceae and Crassulaceae from desert regions. The last paper, by William R. Maxon, contains the description of a new fern from China. This species was found in the Henry collection of Chinese plants, a set of which is in the National Herbarium.

The final part is made up of miscellaneous papers, the first three being continuations of studies published earlier in this series respectively on the Cactaceae, Crassulaceae, and Apiaceae, prepared by J. N. Rose, in collaboration with Dr. N. L. Britton, of the New York Botanical Garden, and Prof. John M. Coulter, of the University of Chicago. The last paper, by G. N. Collins, Assistant Botanist in the Department of Agriculture, is an account of a remarkable development in maize plants grown in a temperate climate from seed produced in the Tropics. It is a suggestive illustration of the effect of environmental change.

J. N. Rose,
Acting Curator.

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SMITHSONIAN INSTITUTION

UNITED STATES NATIONAL MUSEUM

CONTRIBUTIONS

FROM THE

UNITED STATES NATIONAL HERBARIUM

VOLUME XII, PART 1

CATALOGUE

OF THE

BOTANICAL LIBRARY OF JOHN DONNELL SMITH

PRESENTED IN 1905 TO THE SMITHSONIAN INSTITUTION

Compiled by ALICE CARY ATWOOD.

WASHINGTON

GOVERNMENT PRINTING OFFICE

1908

BULLETIN OF THE UNITED STATES NATIONAL MUSEUM.

ISSUED APRIL 23, 1908.

PREFACE.

In January, 1905, Captain John Donnell Smith, of Baltimore, Maryland, presented his herbarium and botanical library to the Smithsonian Institution. The herbarium, consisting of more than 100,000 mounted specimens, became a part of the National Herbarium. The library contains some 1,600 bound volumes, consisting chiefly of works relative to systematic botany, and being especially rich in works relating to Mexico and Central America. For the present, the library is to remain in Baltimore, but Captain Smith has placed his books freely at the disposal of botanists.

Not only have the books been selected with great care, but they are all in conspicuously handsome bindings. It is doubtful if there is any public or private botanical library of its size which can equal it in value from either the scientific or the artistic point of view. A simple but appropriate book plate has been designed and printed and placed in each volume.

An author catalogue of the library is presented herewith, which, it is believed, will be of interest and practical value to many botanists. The cataloguing has been done by Miss Alice Cary Atwood, cataloguer in the office of the Botanist, Department of Agriculture.

J. N. Rose,
Acting Curator.

CATALOGUE OF THE BOTANICAL LIBRARY OF JOHN DONNELL SMITH, PRESENTED IN 1905 TO THE SMITHSONIAN INSTITUTION.

Compiled by ALICE CARY ATWOOD.

In entering separates the following forms are used:

For reprints repaged:

Barbey, W. Le Linnaea borealis. . . . (Bull. Soc. Bot. France, v. 28.) 2 p. 8°. Paris, 1881.

For reprints with original pagination:

Barbey, W. Le Linnaea borealis. . . . Reprinted from Bull. Soc. Bot. France v. 28, p. 272–274. 8°. [Paris, 1882.]

For mere extracts:

Barbey, W. Le Linnaea borealis. . . . Bull. Soc. Bot. France, v. 28, p. 272–274. 1881. 8°.

The note "In Botanical miscellanies" refers to volumes of bound pamphlets which have been given that binder's title; the octavo volumes are regularly numbered. An alphabetical list of the forms of citation used in the text, with their explanations, will be found at the end of the catalogue, beginning on page 88.

A.

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Aiton, William, 1731–1793. Hortus kewensis. . . . 2d ed., enl. by William Townsend Aiton. 5 v. 8°. London, 1810–1818.

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Allen, John A. *See* Goodale, G. L.

Allen, Timothy Field, 1837–1902. Characeae americanae. . . . part I. 1 leaf. pl. 4°. New York, n. d.

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——— Development of the cortex in Chara. . . . (Bull. Torr. Club, v. 9.) 11 p. 8 pl. 8°. n. d.

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Abhandlungen der Kaiserlich-leopoldinisch-carolinischen (deutschen) akademie der naturforscher. *See* Nova acta Leop.-Car. Akad. Naturf.

Actes Congr. Intern. Bot. Actes du Congrès international de botanique.

Adansonia.

Allg. Bot. Zeitschr. Allgemeine botanische zeitschrift.

Am. Journ. Sci. American journal of science.

Am. Month. Mag. & Crit. Rev. American monthly magazine and critical review.

Am. Nat. American naturalist.

Am. Quart. Micr. Journ. American quarterly microscopical journal.

Anales Inst. Fís.-geogr. Nac. Costa Rica. Anales del Instituto fisico-geográfico nacional, Costa Rica.

Anales Mus. Nac. Chile. Anales del Museo nacional de Chile.

Anales Univ. Chile. Anales de la Universidad de Chile.

Ann. Bot. Annals of botany.

Ann. Jard. Bot. Buitenz. Annales du Jardin botanique de Buitenzorg.

Ann. Lyc. Nat. Hist. N. Y. Annals of the Lyceum of natural history of New York.

Ann. Mus. Hist. Nat. Paris. Annales du Muséum d'histoire naturelle, Paris.

Ann. Rep. Missouri Bot. Gard. Annual report of the Missouri botanical garden.

Ann. Roy. Bot. Gard. Calcutta. Annals of the Royal botanic garden, Calcutta.

Ann. Sci. Nat. Bot. Annales des sciences naturelles; botanique.

Anniv. Mem. Bost. Soc. Nat. Hist. Anniversary memoirs of the Boston society of natural history.

Annuaire Cons. et Jard. Bot. Genève. Annuaire du Conservatoire et du Jardin botanique de Genève.

Arb. Bot. Gart. Breslau. Arbeiten aus dem Königl. botanischen garten zu Breslau.

Arch. Mus. Hist. Nat. Paris. Archives du Muséum d'histoire naturelle, Paris.

Arch. Mus. Nac. Rio de Janeiro. Archivos do Museu nacional do Rio de Janeiro.

Arch. Sci. Phys. Nat. Archives des sciences physiques et naturelles (de Genève).

Ark. Bot. Arkiv för botanik.

Asa Gray Bull. Asa Gray bulletin.

Atti Ist. Ven. Sci. Atti del Reale istituto veneto di scienze, lettere ed arti.

Beil. Osterprogr. Realschule Doventhor zu Bremen. Beilage zum Osterprogramm der Realschule beim Doventhor zu Bremen.

Ber. Deut. Bot. Ges. Berichte der Deutschen botanischen gesellschaft.

Ber. Schweiz. Bot. Ges. Berichte der Schweizerischen botanischen gesellschaft.

Bol. Acad. Nac. Cienc. Córdoba. Boletín de la Academia nacional de ciencias de Córdoba.

Bost. Journ. Nat. Hist. Boston journal of natural history.

Bot. Centralbl. Botanisches centralblatt.

Bot. Gaz. Botanical gazette.

Bot. Tidsskr. Botanisk tidsskrift.

Bull. Acad. Intern. Géogr. Bot. Bulletin de l'Académie internationale de géographie botanique.

Bull. Acad. Roy. Belg. Bulletin de l'Académie royale des sciences, des lettres et des beaux-arts de Belgique.

Bull. Calif. Acad. Bulletin of the California academy of sciences.

Bull. Herb. Boiss. Bulletin de l'Herbier Boissier.

Bull. Ill. State Lab. Nat. Hist. Bulletin of the Illinois state laboratory of natural history.

Bull. Misc. Inform. Kew. Bulletin of miscellaneous information, Royal botanic gardens, Kew.

Bull. Misc. Inform. Trinidad. Bulletin of miscellaneous information, Royal botanic gardens, Trinidad.

Bull. Mus. Hist. Nat. Paris. Bulletin du Muséum d'histoire naturelle, Paris.

Bull. Soc. Bot. France. Bulletin de la Société botanique de France.

Bull. Soc. Bot. Ital. Bullettino della Società botanica italiana.

Bull. Soc. Bot. Genève. Bulletin de la Société botanique de Genève.

Bull. Soc. Hort. Genève. Bulletin de la Société d'horticulture de Genève.

Bull. Soc. Imp. Nat. Moscou. Bulletin de la Société impériale des naturalistes de Moscou.

Bull. Soc. Roy. Bot. Belg. Bulletin de la Société royale de botanique de Belgique.

Bull. Soc. Vaud. Sci. Nat. Bulletin de la Société vaudoise des sciences naturelles.

Bull. Torr. Club. Bulletin of the Torrey botanical club.

Bull. Univ. Wisc. Sci. Ser. Bulletin of the University of Wisconsin. Science series.

Bull. U. S. Nat. Mus. Bulletin of the United States national museum.

Canad. Nat. Canadian naturalist.

Canad. Rec. Sci. Canadian record of science.

Centralbl. Bakt. u. Parasitenk. Centralblatt für bakteriologie und parasitenkunde.

Congrès Sci. de France. Congrès scientifique de France.

Contr. Ames Bot. Lab. Contributions from the Ames botanical laboratory.

Contr. Bot. Dept. Iowa Agr. Coll. Contributions from the Botanical department of the State agricultural college, Ames, Iowa.

Dansk. Vidensk. Selsk. Skrift. Det Kongelige danske videnskabernes selskabs skrifter.

Denkschr. Bayer. Akad. Wiss. München. Denkschriften der Königlich-bayerischen akademie der wissenschaften zu München.

Denkschr. Math.-naturw. Klasse Akad. Wiss. Wien. Denkschriften der mathematisch-naturwissenschaftlichen klasse der Kaiserlichen akademie der wissenschaften, Wien.

Denkschr. Schweiz. Naturf. Ges. Denkschriften der Schweizerischen naturforschenden gesellschaft.

Drug. Bull. Druggists' bulletin.

Engler's Bot. Jahrb. Botanische jahrbücher . . . hrsg. von A. Engler.

Ergänzungsheft Peterm. Mitteil. Ergänzungsheft zu Petermann's mitteilungen.

Erythea.

Fedde Repert. Repertorium novarum specierum regni vegetabilis . . . hrsg. von F. Fedde.

Flora.

Gard. Chron. Gardeners' chronicle.

Gartenflora.

Geol. & Nat. Hist. Surv. N. Car. Geological and natural history survey of North Carolina.

Hayden U. S. Geol. & Geogr. Surv. Terr. Bull. United States geological and geographical survey of the territories. F. V. Hayden, U. S. geologist-in-charge. Bulletin.

Hayden U. S. Geol. & Geogr. Surv. Terr. Misc. Publ. United States geological and geographical survey of the territories. F. V. Hayden, U. S. geologist-in-charge. Miscellaneous publications.

Hedwigia.

Hook. Journ. Bot. Hooker's journal of botany.

Jahrb. Bot. Gart. Berlin. Jahrbuch des Kgl. botanischen gartens und des botanischen museums zu Berlin.

Jahrb. Hamburg. Wiss. Anst. Jahrbuch der Hamburgischen wissenschaftlichen anstalten.

Johns Hopkins Univ. Circ. Johns Hopkins university circulars.

Journ. Asiatic Soc. Bengal. Journal of the Asiatic society of Bengal.

Journ. Bot. Journal of botany, British and foreign.

Journ. Cincin. Soc. Nat. Hist. Journal of the Cincinnati society of natural history.

Journ. de Bot. Journal de botanique.

Journ. Elisha Mitchell Sci. Soc. Journal of the Elisha Mitchell scientific society.

Journ. Linn. Soc. Bot. Journal of the Linnean society; botany.

King Rep. U. S. Geol. Explor. 40th parallel. Reports of the United States geological exploration of the 40th parallel, Clarence King . . . in charge.

Linnaea.

Mém. Acad. Imp. Sci. Toulouse. Mémoires de l'Académie impériale des sciences de Toulouse.

Mém. Acad. Roy. Belg. Mémoires de l'Académie royale des sciences, des lettres et des beaux-arts de Belgique.

Mem. Am. Acad. Memoirs of the American academy of arts and sciences.

Mem. Bost. Soc. Nat. Hist. Memoirs of the Boston society of natural history.

Mém. Cour. Acad. Roy. Belg. Mémoires couronnés de l'Académie royale des sciences, des lettres et des beaux-arts de Belgique.

Mém. Soc. Imp. Sci. Nat. Cherb. Mémoires de la Société impériale des sciences naturelles de Cherbourg.

Mém. Soc. Phys. et Hist. Nat. Genève. Mémoires de la Société de physique et d'histoire naturelle de Genève.

Mem. Torr. Club. Memoirs of the Torrey botanical club.

Monatsschr. Kakteenk. Monatsschrift für kakteenkunde.

Nat. Verh. Holland. Maatsch. Wet. Haarlem. Natuurkundige verhandelingen van de Hollandsche maatschappij der wetenschappen te Haarlem.

Naturaleza.

Nederl. Kruidk. Arch. Nederlandsch kruidkundig archief.

Notizbl. Bot. Gart. Berlin. Notizblatt des Kgl. botanischen gartens und museums zu Berlin.

Nouv. Mém. Soc. Imp. Nat. Mosc. Nouveaux mémoires de la Société impériale des naturalistes de Moscou.

Nova. acta Acad. Caes. Leop.-Car. Nova acta physico-medica Academiae Caesareae Leopoldino-carolinae naturae curiosum (Erlangen, Bonn, Breslau).

Nova acta Leop.-Car. Akad. Naturf. Nova acta der Kaiserlich-leopoldinisch-carolinischen (deutschen) akademie der naturforscher. (Dresden, Halle.)

Nova acta Soc. Sci. Upsal. Nova acta Regiae societatis scientiarum upsaliensis.

Novi Comm. Acad. Sci. Inst. Bonon. Novi commentarii Academiae scientiarum instituti bononiensis.

Nuovo Giorn. Bot. Ital. Nuovo giornale botanico italiano.

Oesterr. Bot. Zeitschr. Oesterreichische botanische zeitschrift.

Ofvers. Svensk. Vetensk. Akad. Förh. Ofversigt af Kongliga svenska vetenskaps-akademiens förhandlingar.

Osterprogr. Realschule Doventhor zu Bremen. Osterprogramm der Realschule beim Doventhor zu Bremen.

Ottawa Nat. Ottawa naturalist.

Overs. Dansk. Vidensk. Selsk. Forh. Oversigt over det Konge-lige danske videnskabernes selskabs forhandlingar.

Pop. Sci. Month. Popular science monthly.

Proc. Acad. Phila. Proceedings of the Academy of natural sciences of Philadelphia.

Proc. Am. Acad. Proceedings of the American academy of arts and sciences.

Proc. Am. Assoc. Adv. Sci. Proceedings of the American association for the advancement of science.

Proc. Am. Phil. Soc. Proceedings of the American philosophical society.

Proc. Biol. Soc. Wash. Proceedings of the Biological society of Washington, D. C.

Proc. Bost. Soc. Nat. Hist. Proceedings of the Boston society of natural history.

Proc. Calif. Acad. Proceedings of the California academy of sciences.

Proc. Davenp. Acad. Proceedings of the Davenport academy of natural sciences.

Proc. Linn. Soc. Proceedings of the Linnean society.

Proc. Linn. Soc. N. S. W. Proceedings of the Linnean society of New South Wales.

Proc. Wash. Acad. Proceedings of the Washington academy of sciences.

Purdue Univ. School Sci. Bull. Purdue university. School of science bulletin.

Rev. Inst. Hist. Geogr. Brasil. Revista (trimensal) do Instituto historico, geographico e ethnographico do Brasil.

Rev. Mus. La Plata. Revista del Museo de La Plata.

Rev. Mycol. Revue mycologique.

Rhodora.

Science.

Sitzungsb. Bayer. Akad. Wiss. München. Sitzungsberichte der Königlich-bayerischen akademie der wissenschaften zu München.

Sitzungsb. Preuss. Akad. Wiss. Berlin. Sitzungsberichte der Königlich preussischen akademie der wissenschaften zu Berlin.

Smithson. Contr. Knowl. Smithsonian contributions to knowledge.

Smithson. Misc. Coll. Smithsonian miscellaneous collections.

Studies Johns Hopkins Biol. Lab. Studies from the Johns Hopkins biological laboratory.

Timehri.

Torreya.

Trans. Acad. Sci. St. Louis. Transactions of the Academy of sciences of St. Louis.

Trans. & Proc. N. Z. Inst. Transactions and proceedings of the New Zealand institute.

Trans. Bot. Soc. Edinb. Transactions of the Botanical society of Edinburgh.

Trans. Linn. Soc. Transactions of the Linnean society.

Trans. Linn. Soc. Bot. Transactions of the Linnean society; botany.

Trans. N. Y. Acad. Transactions of the New York academy of sciences.

U. S. Dept. Agr. Bur. Pl. Ind. Bull. United States department of agriculture—Bureau of plant industry. Bulletin.

U. S. Dept. Agr. Div. Agros. Bull. United States department of agriculture—Division of agrostology. Bulletin.

U. S. Dept. Agr. Div. Agros. Circ. United States department of agriculture—Division of agrostology. Circular.

U. S. Dept. Agr. Div. Bot. Bull. United States department of agriculture—Division of botany. Bulletin.

U. S. Dept. Agr. Div. Bot. Circ. United States department of agriculture—Division of botany. Circular.

U. S. Dept. Agr. Div. Bot. Spec. Bull. United States department of agriculture—Division of botany. Special bulletin.

U. S. Dept. Agr. Div. For. Bull. United States department of agriculture—Division of forestry. Bulletin.

U. S. Dept. Agr. Farmer's Bull. United States department of agriculture. Farmer's bulletin.

U. S. Dept. Agr. Fiber Invest. Rep. United States department of agriculture—Fiber investigations. Report.

U. S. Dept. Agr. Rep. United States department of agriculture. Report.

U. S. Dept. Agr. Spec. Rep. United States department of agriculture. Special report.

Verh. Bot. Ver. Prov. Brandenb. Verhandlungen des Botanischen vereins der provinz Brandenburg.

Verh. Naturf. Ges. Basel. Verhandlungen der Naturforschenden gesellschaft in Basel.

Verh. Schweiz. Naturf. Ges. Zofingen. Verhandlungen der Schweizerischen naturforschenden gesellschaft, Zofigen.

Verh. Zool. Bot. Ges. Wien. Verhandlungen der K. K. Zoologisch-botanischen gesellschaft in Wien.

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VOLUME XII, PART 2

THE LECYTHIDACEAE OF COSTA RICA

By H. PITTIER DE FÁBREGA

TONDUZIA, A NEW GENUS OF APOCYNACEAE FROM CENTRAL AMERICA

By H. PITTIER DE FÁBREGA

A COLLECTION OF PLANTS FROM THE VICINITY OF LA GUAIRA, VENEZUELA

By J. R. JOHNSTON

WASHINGTON
GOVERNMENT PRINTING OFFICE
1908

BULLETIN OF THE UNITED STATES NATIONAL MUSEUM:

ISSUED MAY 20, 1908.

PREFACE.

From 1887 to 1903 Mr. Henri Pittier resided in Central America, devoting a large part of his time to the study of its flora. He made extensive collections and published various botanical papers. Since coming to Washington, in 1903, Mr. Pittier has continued his study of this flora, and in the two short papers herein offered he presents some of the results.

The third paper is a report by Mr. J. R. Johnston, of the Department of Agriculture, upon a collection of plants obtained by Capt. Wirt Robinson and Dr. M. W. Lyon, jr., in Venezuela. Mr. Johnston was asked to determine these species because he had himself collected in that country and was somewhat familiar with its flora. The collection, though a small one, proves to contain five new species, and this paper, like many others in the Contributions, emphasizes the richness of the tropical American flora.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

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THE LECYTHIDACEAE OF COSTA RICA.

By H. Pittier de Fábrega.

On account probably of the difficulty of obtaining good specimens, the Lecythidaceae of Costa Rica have been practically overlooked by former collectors. The species do not appear to be numerous, and it is likely that the present paper includes most of those to be found in that country, as well as in the neighboring Republic of Nicaragua. It should be mentioned, however, that one species of the genus Grias has been found in Panama and may occur also within the limits of Costa Rica. The four species described here belong to three of the genera admitted by Niedenzu in his elaboration of the family for the Pflanzenfamilien,[a] and a careful comparison of the material at hand with Miers's descriptions[b] has satisfied me beyond any doubt that we have to do with hitherto unnoticed forms, except in the case of *Couroupita nicaraguarensis*, discovered by Oersted some fifty years ago.

The species described here belong to the Lecythidoideae proper. They are mostly large trees, with showy, dense foliage. The leaves are alternate and exstipulate, entire except in one case, more or less coriaceous, and with short petioles. The inflorescence is racemose. The sepals and petals are 6 each. The stamens are united at the base in a ring that is extended on one side in a helmet-like blade (*androphorum*) inflexed above the ovary. The ovary is 2 to 6-celled. The fruit is a capsule, or *pyxidium*, more or less coriaceous or thick-walled and always polyspermous; its circumference generally shows 2 more or less marked circular lines, the inferior of which corresponds to the base of the sepals and has been called by Miers *calycary zone*, while the upper is the line of dehiscence of the operculum and indicates the junction of the floral disk with the vertex of the ovary. The space between these two concentric lines is known as the *interzonary band*. The seeds differ in the three genera in their structure and mode of attachment.

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[a] Engl. & Prantl, Pflanzenfam. 3[7]: 26–41. 1892.

[b] J. Miers, On the Lecythidaceae, Trans. Linn. Soc. **30**: 157–318. *pl. 33–65.* 1874.

Of our three Costa Rican genera, Couroupita is an old and well-defined one, established by Aublet,[a] while the two remaining have undergone a considerable number of changes as to their systematic position. Originally all the species divided now between Lecythis and Eschweilera were included in the first, created by Loefling in 1758.[b] Von Martius was the first to show, although in a confused way, the difference in the mode of suspension of the seeds, and to propose the second genus, which appeared for the first time in De Candolle's Prodromus[c] in 1828. Endlicher[d] again brought together all the species under Loefling's genus, and this view was generally accepted until Miers published his important memoir on the subject in 1874. This botanist showed conclusively the value of certain structural differences of the flower and the fruit for the rational limitation of Lecythis, and from the excluded species he formed his three genera Eschweilera, Chytroma, and Jugastrum, which were subsequently found to differ from each other to a much less extent than they do together from Lecythis, and which have in consequence been reduced by Niedenzu to mere sections of one single genus, for which the old name Eschweilera, given by von Martius, has been retained. Of the two Costa Rican species of that genus, one certainly belongs to the section Eueschweilera, while I place the second with doubt, until the flowers have been investigated, in the section Chytroma.

KEY TO THE COSTA RICAN GENERA.

Seeds sessile and erect in the fruit; small trees ..... 1. *Eschweilera.*
Seeds hanging from long, mostly fleshy funicles.
  Fertile stamens both on ring and helmet of androphorum; fruit indehiscent; seeds small, ovate, surrounded by a juicy pulp ..... 2. *Couroupita.*
  Fertile stamens only on ring; fruit dehiscent; seeds large, fusiform, hard-shelled, without pulp but with large fleshy funicles ..... 3. *Lecythis.*

Eschweilera Mart.; DC. Prod. **3**: 293. 1828.[e]

Flowers perigynous; calyx adnate; petals ovate, caducous; fertile stamens borne only on the ring; ovary 2-celled, with few anatropous ovules in each cell; seeds shaped more or less like the segments of a sphere, showing the embedded raphe when dry.

Both our Costa Rican species seem to be small or medium-sized trees, with rather narrow crown and large coriaceous leaves.

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[a] Pl. Gui. **2**: 708. 1775.

[b] Iter Hispan. 159. 1758.

[c] **3**: 293.

[d] Gen. Pl. 1235. no. 6332. 1836–1850.

[e] As explained above, De Candolle's definition of this genus is not altogether clear, and this is the probable reason why Endlicher rejected it and reincorporated its several species in Lecythis. As early as 1837, however, von Mar-

ESCHWEILERA CALYCULATA PITTIER.

ESCHWEILERA CALYCULATA PITTIER.

KEY TO THE SPECIES.

Sepals free at base of fruit; leaves elliptic-ovate, abruptly acuminate, with thick salient nerves ..... 1. *E. calyculata.*
Calyx concrescent with fruit; leaves lanceolate, finely nerved .. 2. *E. collinsii.*

1. **Eschweilera (Eueschweilera) calyculata** Pittier, sp. nov. PLATES I, II.

A tree 8 to 15 meters high and up to about 40 cm. in diameter, with elongated crown; branchlets grayish, verrucose; leaves varying from 10 to 35 cm. long, and 4 to 12 cm. broad, glabrous, entire with slightly revolute margin, paler beneath, the petioles thick, 2 cm. long, blackish, the blades elliptic-oblong, broadly acute or rounded at base, rounded and abruptly acuminate at tip, the main and secondary nerves very salient underneath and the latter indicated on the upper face by a corresponding depression, these nerves rather distant, more so at the middle of the blade, 11 to 12 pairs on each leaf, arched and anastomosed together along the margin; the intermediary venules also richly anastomosed, showing a fine prominent net on both faces, although more marked below; raceme terminal, or sometimes axillar, with numerous alternate flowers, the rachis not angulose, more or less verrucose; flowers rather large, pale yellow, caducous; pedicels 1 to 2 mm. long; sepals ovate, coriaceous, verrucose without, longitudinally striate within, with a thin, sublobulate margin, 5 mm. in length and breadth, but twice as large in fruit; petals about 20 mm. long, 8 mm. broad, obovate; androphorum large; ovary 2-celled; style 1 to 2 mm. long, conical; pyxidium 7 cm. in diameter and about 6 cm. high, depressed-globose, thin-walled, rather smooth, with persistent sepals becoming twice larger than in flower, the interzonary band 3 cm. broad; seeds 3 to 5 in each cell.

Forests between Port Limon and Moin, H. Pittier, September, 1899, flowers (Instituto físico-geográfico de Costa Rica, no. 16008; U. S. National Herbarium no. 578009, type); clearings around Rio Hondo, H. Pittier, May, 1902, photographs only (U. S. National Herbarium).

Plate II is one-half natural size.

Not infrequent on the Atlantic coastal plain at elevations up to 100 meters.

2. **Eschweilera (Chytroma?) collinsii** Pittier, sp. nov. PLATE III. FIGURE 1.

Branchlets gray, obscurely striate longitudinally; petioles 1 cm. long, deeply canaliculate; leaf blade 19 cm. long, 5.5 cm. broad, smooth, lanceolate, broadly cuneate at base, narrowing insensibly into a long tip, shiny above, paler underneath; main secondary nerves very salient beneath, numerous, close together, running in an almost straight line to the marginal zone, where they merge into each other; intermediary nervules also straight, shorter; margin distinctly crenato-[illegible]guate, the sinuses often marked by a black spot; racemes large, with alternat[illegible], deciduous branchlets, bearing 15 to 20 alternate flowers, these also all caducous except the terminal one on the last branchlet, the main and secondary rachis gray, longitudinally striate and covered with numerous brown, verrucose excrescences: pedicels 1 to 2 mm. long; flowers not seen; pyxidium terminal on last branchlet of raceme, 10 cm. in diameter, the interzonary band 4 cm.

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tius had personally given a more accurate description of his genus, in the following terms: "Genus Eschweilerae non iis innititur characteribus, quos clarissimus De Candolle indicavit, sed ita erit constituendum: Lobi calycis 4–6. Petala 4. Ligula uti in Lecythide. Ovarium bi-loculare, ovulis sub 20 adscendentibus. Stylus rectus. Pyxidium lignoso-coriaceum, operculo deciduo, tandem uniloculare. Semina abortu ovulorum subquatuor obovata vel oblonga, erecta, pulpae immersa." (Flora **2**: Beibl. 89. 1837.) The type species of the genus is *Eschweilera parvifolia Mart.*, from Brazil.

broad, the total height 9 cm., a short protuberance at insertion of peduncle, the operculum rather flat or broadly convex; seeds 1 to 3 in each cell, about 4 cm. long, 2.7 cm. in radial breadth, 1 to 2 cm. thick, with a rugose, granulated surface and a hard, coarse testa.

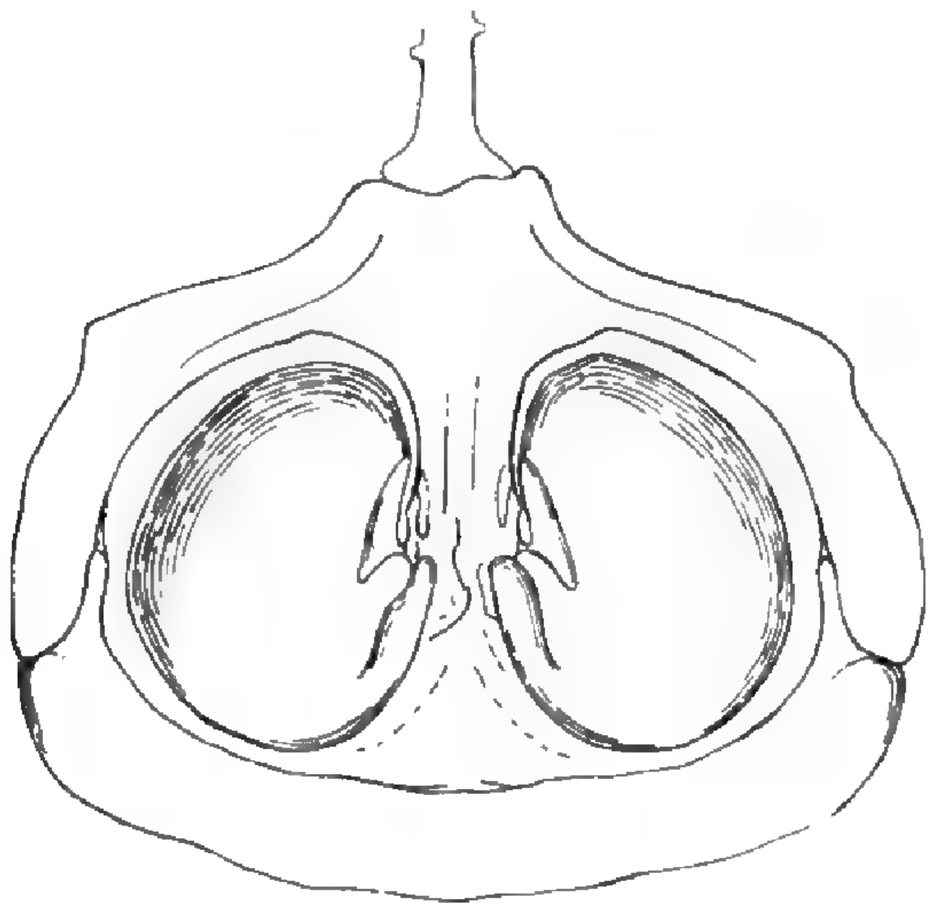


FIG. 1.—Fruit of *Eschweilera collinsii*. Longitudinal section. One-half natural size.

Our only specimen, consisting of a branchlet with attached leaf and fruit, and supplemented by a few good pictures of the latter, was collected in the forests of the plains of San Carlos, northern Costa Rica, April 15, 1903, Cook & Doyle, no. 95 (U. S. National Herbarium no. 473872). It is somewhat defective, although sufficient to show that it does not correspond to the description of any of the species hitherto published. Figure 1 has been somewhat schematically reconstructed from one of the photographs, to show the mode of suspension of the seeds, characteristic of the genus.

Plate III is natural size.

Couroupita Aubl. Pl. Guian. **2**: 708. 1775.

Calyx adnate, sepals small; petals rather large; androphorum with fertile stamens both on the ring or disk and on the helmet or galea; ovary 6-celled, stigma 6-sulcate; fruit large, globose, with a small, adhering operculum and containing from 30 to 40 small, ovoid, velvety-pubescent seeds embedded in a viscous, fetid pulp.—High trees, with a lofty, thick trunk and a flat or elongated crown; leaves oblong-elliptic; inflorescence racemose; flowers generally much larger than in the other genera of the same tribe.

1. Couroupita nicaraguarensis DC. Prod. **3**: 294. 1828.[a] FIGURE 2.

"Leaves obtuse; margin of calyx lobulate," petals obtuse; greatest diameter of flower 7.5 cm., the 6 petals obovate, obtuse, alternate, the 3 exterior slightly smaller, 2 to 3.5 cm. long, 1.8 to 2.2 cm. broad; stamens very numerous upon both the disk and the galea, the anthers ovoid, 0.5 mm. long, 0.5 mm. broad, sessile upon dark appendages, these about 1 mm. long and distinctly claviform on the disk, a little longer, broad at base, and attenuate at tip on the galea.

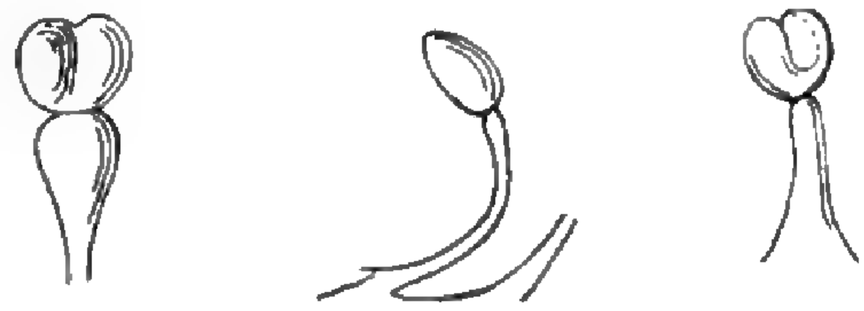
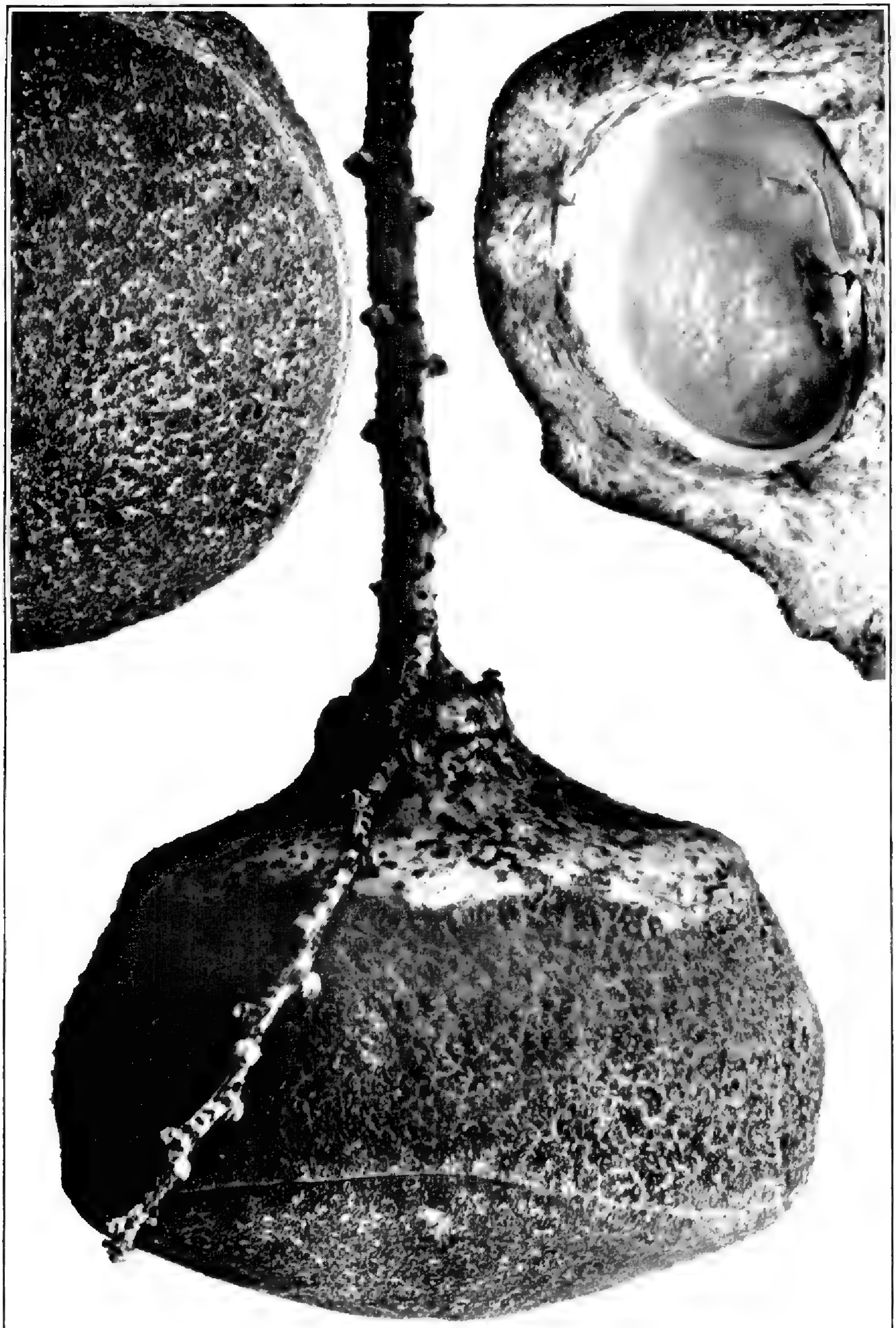


FIG. 2.—Stamens of *Coroupita nicaraguarensis*. Middle stamen from the galea, the others from the disk. Much enlarged.

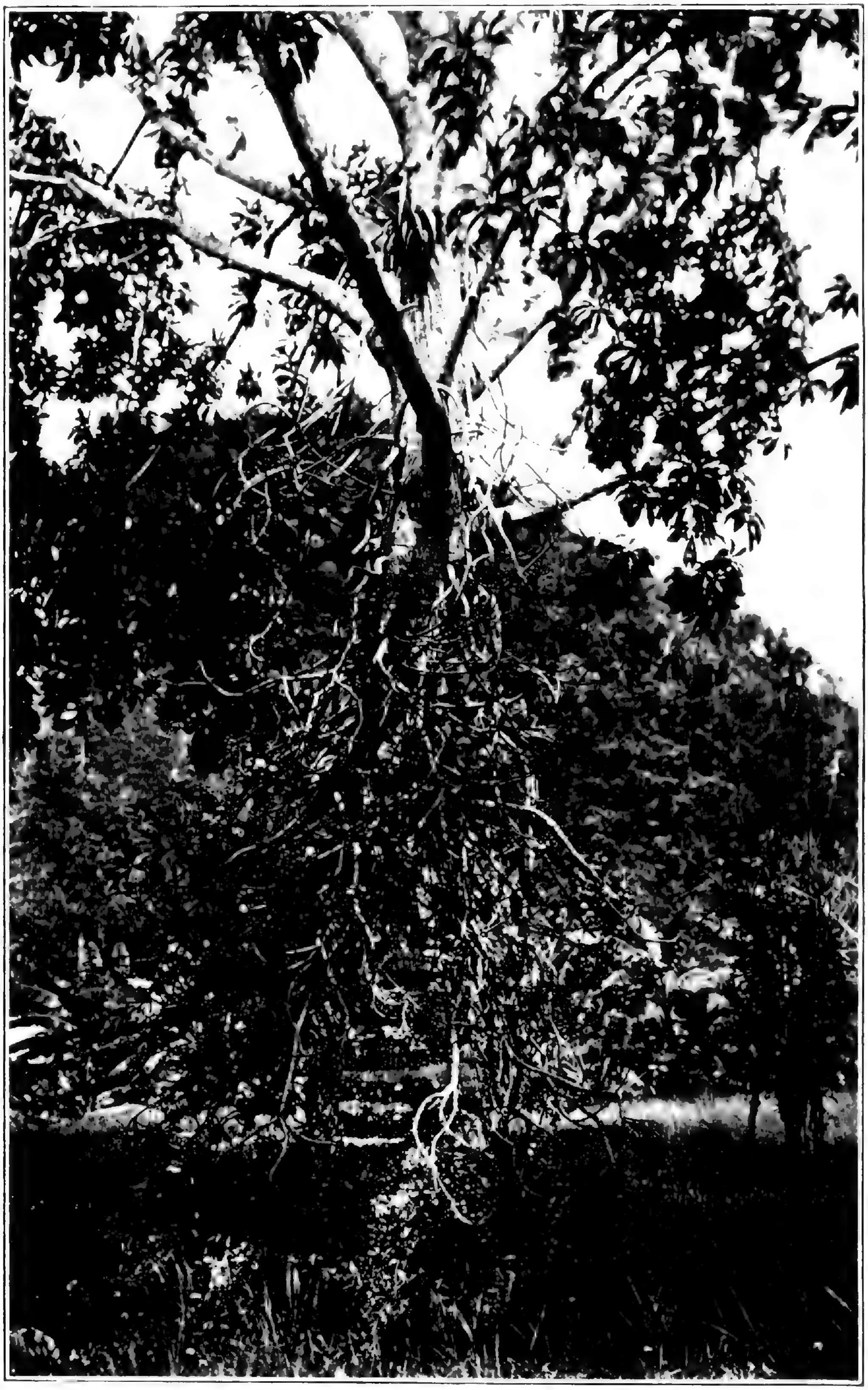
De Candolle's description is limited to seven words, and we are scarcely able to do better now, the only material at hand consisting of a few specimens of the caducous parts of the flower, including the corolla and the adhering androphorum, collected by W. C. Shannon along the Ochomogo River, north of Rivas, Nicaragua, in March, 1903, and distributed by Capt. John Donnell Smith under no. 5004. De Candolle observes that the flowers of this species are smaller than those of *C. guianensis*, which we find to be true, and that it differs, moreover, by the brownish white color of the same and the bluish pulp inside the fruit.

Oersted, who collected the only known specimens, does not give any description of the tree, but says: "While the Lecythidaceae play an important part in

[a] The specific name is spelled in the Prodromus *nicaraguarensis*, a needlessly long and cumbersome substitute for *nicaraguensis*.



FRUIT OF ESCHWEILERA COLLINSII PITTIER.



COUROUPITA GUIANENSIS AUBL.

COUROUPITA GUIANENSIS AUBL.

the flora of South America, this is the only species that goes beyond the Isthmus of Panama. It is one of the most conspicuous trees in the forests between Granada and Tortuga (Nicaragua), where it attracts the attention of the passer-by by its lofty trunk, regular round crown, and large, globose fruits, hanging in close clusters. I found nature fruits in February. These are called by the natives 'zapotes del mico,' on account of their likeness to the true zapotes (Lucuma) and the readiness with which they are eaten by the monkeys. A closely allied species, *C. guianensis*, is known in Guiana under the name of cannonball tree." [a]

As will be seen from the present paper, our knowledge of the species of the family north of Panama has somewhat improved since Oersted's time, although much remains to be done. Complete specimens of *Couroupita nicaraguarensis* has never to my knowledge been collected, and I am aware of the presence of that tree in Costa Rica only because it came under my observation in 1891 at Salinas Bay (where it is also known as zapote de mico) and in Nicoya in 1903. The round fruits, slightly swollen along the calycinal band, were about 10 cm. in diameter and filled with a nauseous pulp surrounding numerous seeds.

The flowers of the nearly related *C. guianensis*, which is the type of the genus, are about 10 cm. in diameter, with petals 4.5 cm. long and 3.5 cm. broad (Plate V). Its very much elongated racemes grow directly from the trunk and main limbs, as shown in Plate V (as well as Plate IV) taken at the Castleton Gardens in Jamaica by Mr. G. N. Collins. I do not remember having noticed any such arrangement in the Costa Rican zapote de mico, and the flowers escaped my attention.

Plate V is natural size.

Meirs [b] inclines to the belief that this species is identical with *C. odoratissima* Seemann. The above description settles the question in the negative. The leaves of *C. nicaraguensis* are obtuse and neither cuneate at the base nor abruptly acuminate at tip; the flower is 7.5 cm. in diameter, while it varies from 4 to 5 cm. in Seemann's plant; further, the anthers in our species are sessile on the appendages and not borne on capillary filaments, as is the case in the other one.

Lecythis Loefl. Iter Hispan. 159. 1758.

Flowers not quite epigynous, calyx and corolla with 6 (seldom 7) divisions; fertile stamens mostly on the disk; ovary 4 (or 5)-celled, style much longer than in the foregoing genera; pyxidium large, ovate, thick-walled, woody; operculum deciduous; seeds typically 9, but oftener 4 to 9, in each of the 4 or 5 cells, elongate and longitudinally sulcate, with a woody, thick shell, covering a large embryo, edible in the Costa Rican species.—Trees generally of great size, with hard wood, elliptic leaves, and large racemes of white, pinkish, or yellow flowers.

Lecythis costaricensis Pittier, sp. nov. PLATES VI, VII, VIII. FIGURES 3, 4.

A lofty tree, with shaft-like trunk about 25 meters high and 1 meter in diameter, and broadly spreading limbs; leaves oblong-lanceolate, subcordate at base and long-acuminate; margin serrate; petioles about 5 mm. long; inflorescence terminal; flowers not seen; pyxidium globose, 16 cm. in diameter on the calycary zone, 15.5 cm. total height, the basal part hemispherical, cup-shaped, obscurely 4-lobed; interzonary band about 5.5 cm. broad, of conical appearance; operculum dome-like, 2.7 cm. high, 9.5 cm. in diameter; calycary zone with 6 distinct protuberances corresponding to the sepals and each abruptly

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[a] Myrtaceae centroamericanae, Vidensk. Meddel. Kjöb. **1855**: 16. 1856–57.

[b] Trans. Linn. Soc. **30**: 191.

contracted into a narrow, acute tip; walls woody and nearly 2 cm. thick; opening 5.5 cm. in diameter; inside divided in 4 cells by persistent septa reaching a little over halfway from the inside periphery to the center (figs. 3, 4); axis of pyxidium occupied by a thick, 4-winged columella connected at the base with the septa, thinner and quadrangular toward its upper end, and then spreading again in a 4-winged expansion concrescent with the base of the operculum (when mature the columella breaks just at the thinnest place below that expansion, thus loosing the operculum); seeds fusiform, sulcate, 4 to 5 cm. long, 1.7 to 2 cm. in diameter, typically 9 in each cell, but oftener 6 to 8, attached in 3 rows (of 3 each) at base of columella, through a thick, fleshy funicle.

On the plains of San Carlos, at La Sedina, at about 100 meters above sea level. The tree that was especially noticed by Mr. O. F. Cook, Mr. G. N. Collins, and myself in April, 1903, grew on a wooded hill near the cacao plantations of the above-named finca and made itself conspicuous among the other forest trees by its larger dimensions. On the ground were found old shells and fresh seeds and opercules, and we also succeeded in obtaining a fresh fruit with its

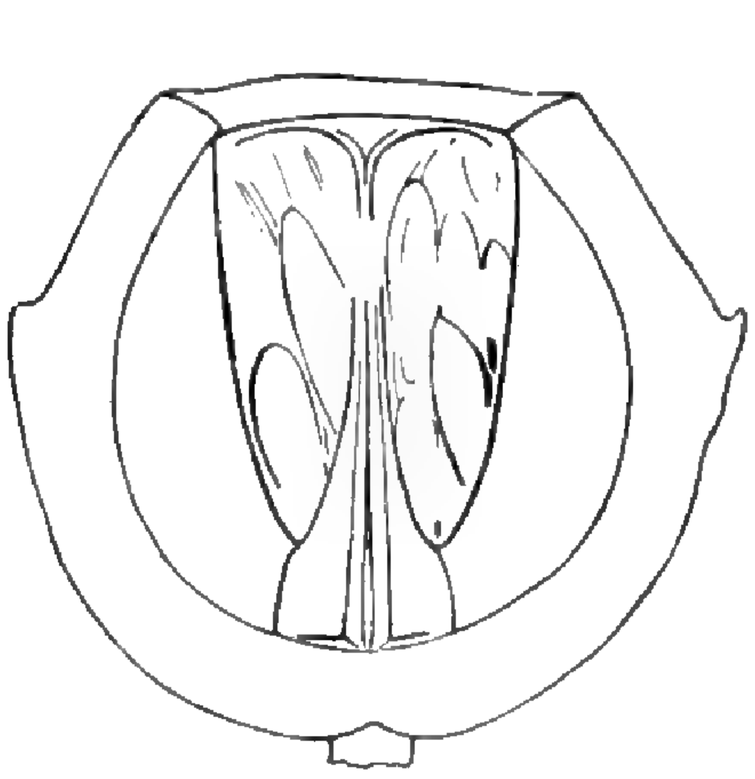


FIG. 3.—Fruit of *Lecythis costaricensis*. Longitudinal section. One-half natural size.

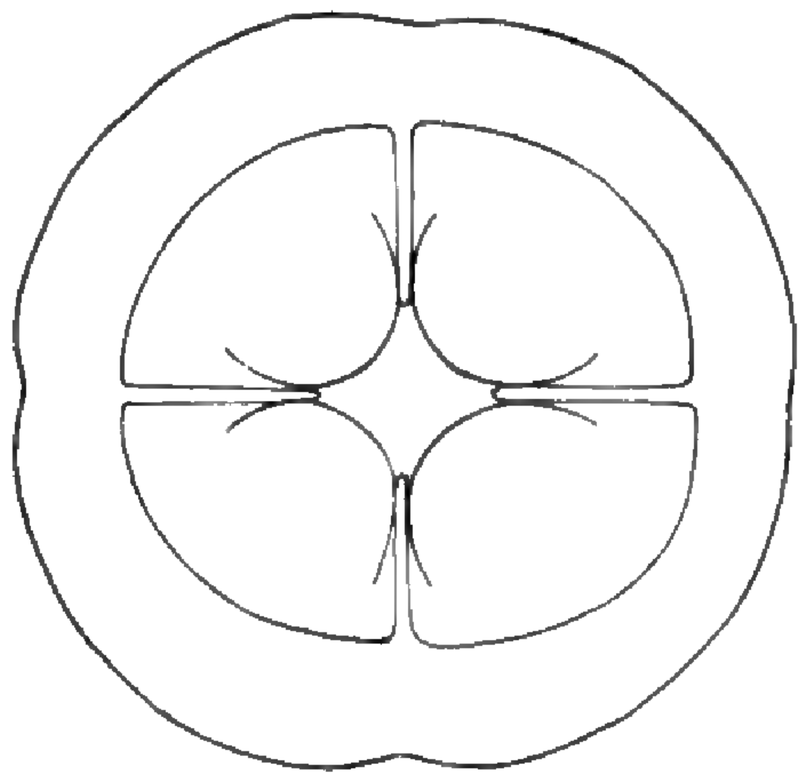


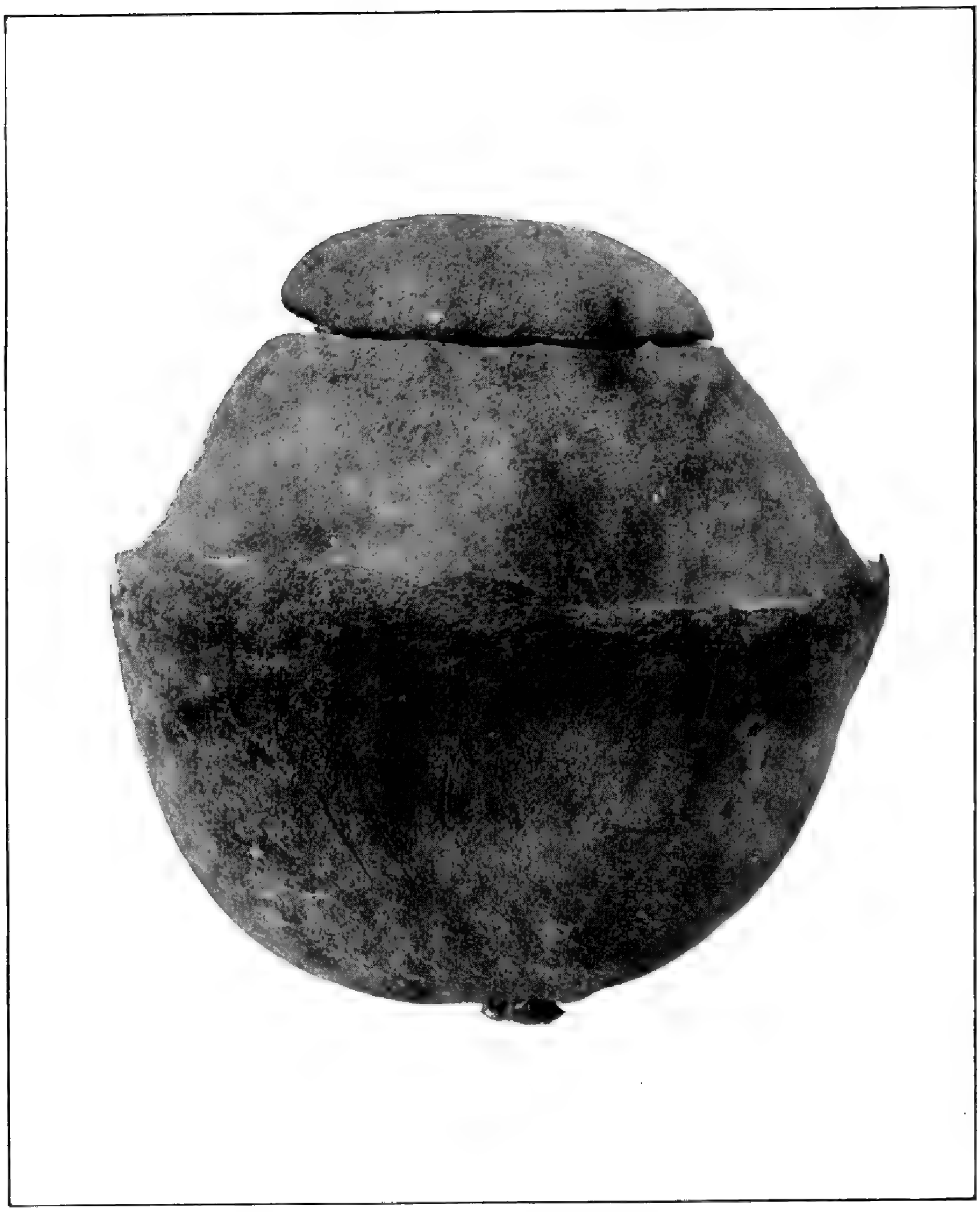
FIG. 4.—Fruit of *Lecythis costaricensis*. Transverse section. One-half natural size.

contents, that had accidentally fallen; these were carefully photographed by Mr. C. B. Doyle and belong now to Mr. Cook's collection.

EXPLANATION OF PLATES.—Plate VI one-half, Plate VII about one-fourth natural size; Plate VIII natural size. In Plate VIII the smooth, light-shaded bodies attached to the seeds are the fleshy funicles.

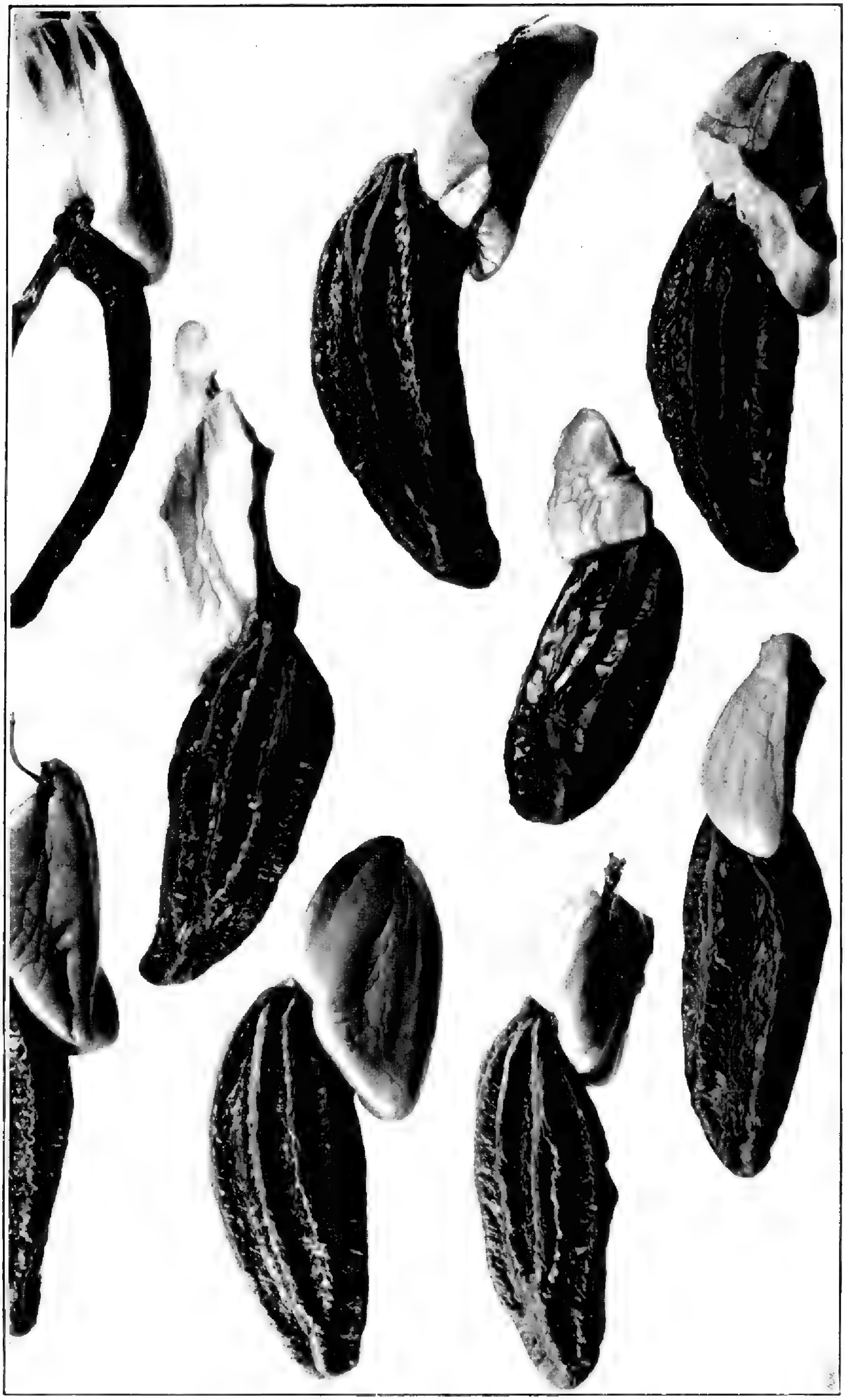
From the general description of the leaves the specimen under consideration would come near *Lecythis lanceolata* Poir., but the fruit is widely different. The name of *L. ollaria* has often been given to the Costa Rican species, more for convenience's sake than for accuracy. Nobody truly knows what *L. ollaria* is, although it must be considered the type species of the genus; and it is not unlikely that Loefling's imperfectly described Venezuelan species has been renamed by later botanists.

The species from Costa Rica is known among the natives as *cocobola*, while the fruit is the *olla de mono* or monkey pot. The hard wood is used in the making of carts, and the nuts are eagerly sought by squirrels, monkeys, and men. Their flavor is much finer than that of the Brazil nuts of commerce, but the supply of them is insignificant.



PYXIDIUM OF LECYTHIS COSTARICENSIS PITTIER.

PYXIDIA OF LECYTHIS COSTARICENSIS PITTIER.



SEEDS OF LECYTHIS COSTARICENSIS PITTIER.

The tree bears and is easily reproduced by seeds. Six of these, planted in the garden of the observatory at San José, all germinated after having been from twenty-eight to thirty-six days in the ground. For some reason they had to be removed with the exception of one, which had reached a height of about 30 cm. above the ground in three months. There is little doubt that the tree could be cultivated with no great difficulty in its native home, in the warm, humid plains of San Carlos, Sarapiquí, and Santa Clara, and in other tropical countries of similar climatic conditions. The output of the nuts would thus be increased, and these might become a valuable addition to the food products of our markets.

TONDUZIA, A NEW GENUS OF APOCYNACEAE FROM CENTRAL AMERICA.

By H. Pittier de Fábrega.

Tonduzia Pittier, gen. nov.

Calyx small, deeply incised, with 5 imbricate, rounded-triangular, obtuse divisions, these scarious on the margin, two of them exterior; corolla salver-shaped, with a long, narrow tube, enlarged at the insertion of the stamens, and 5 linear-oblong, sinistrorse divisions; discus cupuliform; stamens 5, inserted on lower half or about the middle of the tube of the corolla: filaments short and slender; anthers cordate-lanceolate, acute; ovary bicarpellate, with over 12 ovules disposed in 2 rows in each carpel; style parted either only at base or for about one-third of its whole length and bearing at its upper part a thick, broad disk, from this emerging a claviform, more or less distinctly cleft, minutely hirsute stigma; follicles 2, pendent, cylindrical, apiculate, broadly diverging, opening at maturity along a ventral line; seeds flattened, obovate-elliptic, fixed by an almost indistinct umbilic and ciliate all around their narrow edge.—Trees or shrubs with 4-verticillate, penninerve, smooth, more or less coriaceous leaves, forming clusters at the end of the branchlets. Flowers numerous, small, glabrous, in terminal or pseudoterminal cymes.

Near to Aspidosperma, from which it differs by its long, cylindrical follicles, its short umbilical string, its fringed and not winged seeds, and a few other minor characters.

Tonduzia parvifolia Pittier, sp. nov. Figures 5, 6.

Leaves coriaceous, smooth, lanceolate, acute and attenuate at base, long-acuminate, 6 to 12 cm. long, 0.8 to 2 cm. broad, with the 16 to 20 pairs of secondary nerves more or less distinctly apparent in dark lines on the inferior, paler face; petioles 0.5 to 1.5 cm. long; margin entire, revolute; bracteoles in whorls at base of pedicels, very small, ovate-oblong; pedicels 2 to 3 mm. long in flower, 6 to 12 mm. in the mature fruit; calyx verrucose, minutely hirsute at base, persistent, 0.8 to 1.2 mm. long; corolla white; tube 4 to 5 mm. long, inflated in lower half, enlarged and hairy inside at throat; lobes of corolla 2 to 3 mm. long; discus cupuliform, with deeply lobulate margin; anthers cordate, lanceolate, slightly hairy, pollen spherical; style minutely hirsute, scarcely cleft at base; stylar disk higher than broad, conical; stigma claviform but distinctly cleft; follicles striate, rather thick, slightly depressed, 8 to 11 cm. long, 12 to 15 mm. in circumference; seeds

Fig. 5.—Stamen, pistil; and seed of *Tonduzia parvifolia*. Much enlarged.

fish-like, neatly ciliate, 13 to 15 mm. long, 3 to 4 mm. broad, including ciliate margin.

Hacienda Belmira, near Santa Maria de Dota, Costa Rica, altitude 1,450 meters, Tonduz, January, 1898, flowers and fruit (Instituto físico-geográfico de Costa Rica, no. 11619); Angostura, near Turrialba, altitude about 700 meters, Cook & Doyle, no. 33, April 11, 1903 (U. S. National Herbarium, no. 577471, type).

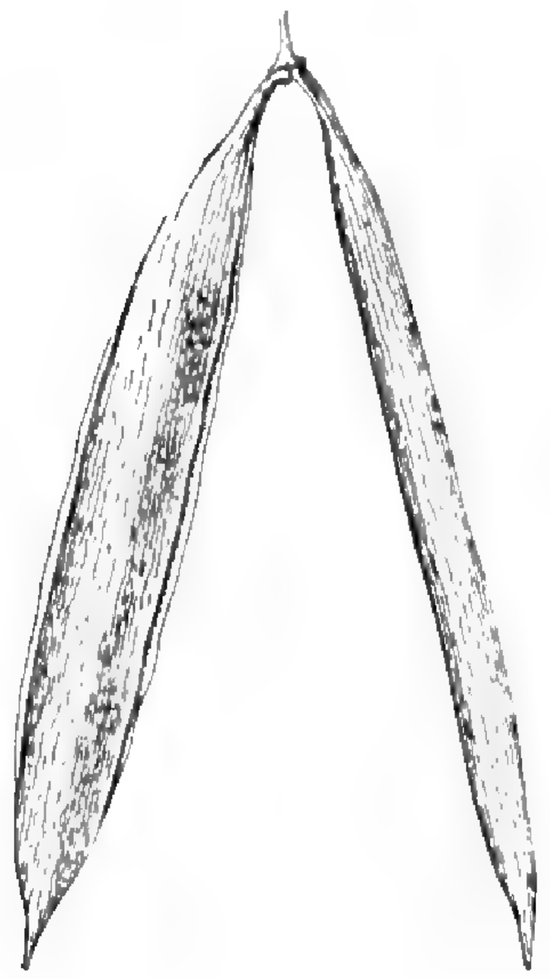


FIG. 6.—Fruit of *Tonduzia parvifolia*. One-half natural size

Tonduzia stenophylla (Donnell Smith) Pittier.

PLATE IX.

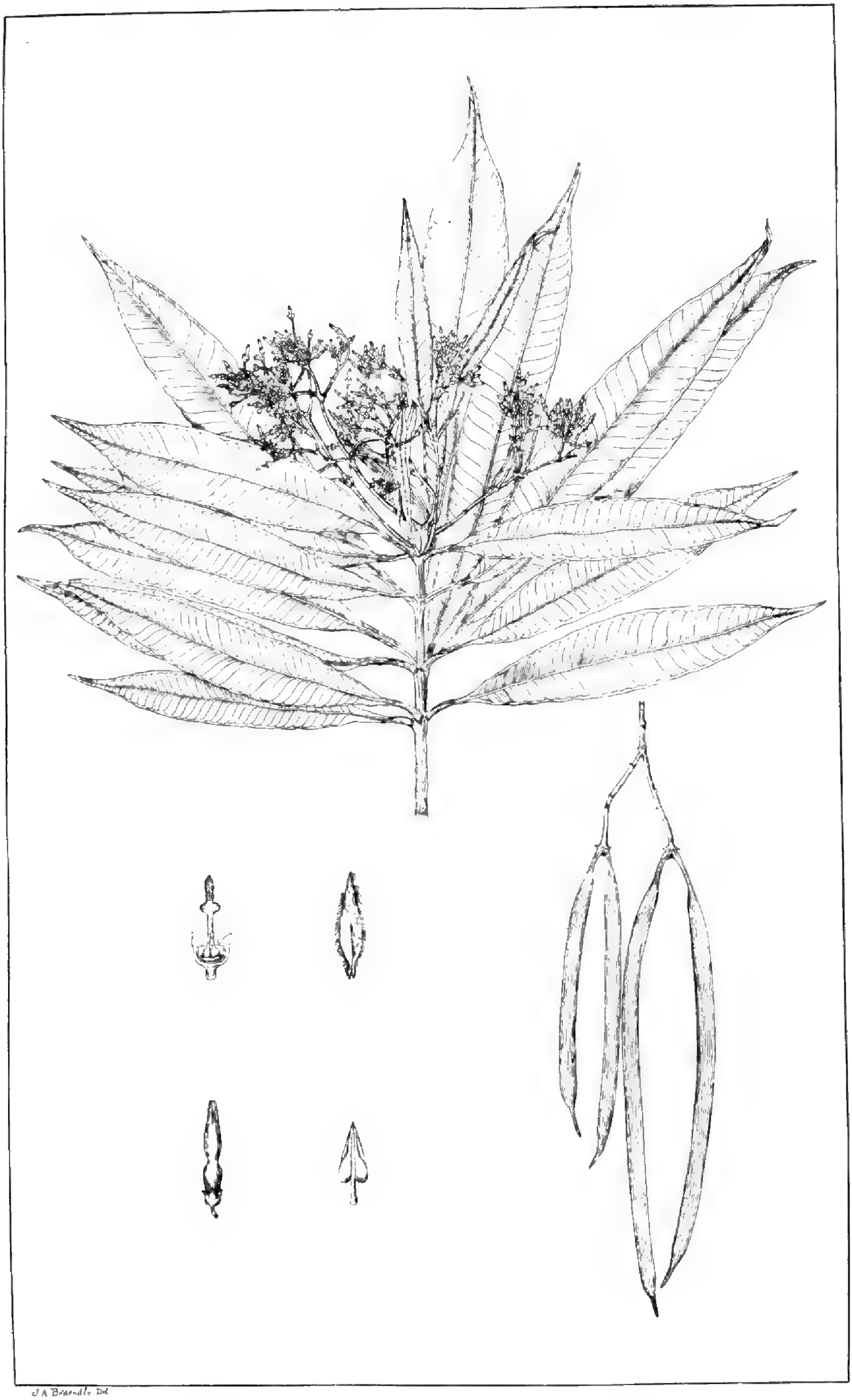
Rauwolfia stenophylla Donnell Smith, Bot. Gaz. **44**: 115. 1907.

Glabrous; upper internodes 8 to 20 mm. long; leaves elliptic-lanceolate, attenuate, chartaceous, varying in size in the same whorl, 9 to 17 cm. long, 1 to 3 cm. broad; secondary nerves 30 to 35 pairs, arcuate near the margin; veins indistinct; petioles canaliculate, 7 to 18 mm. long; cymes pseudoterminal, corymbiform, reaching about one-third of the length of the nearest leaves, dichotomous and many-flowered; pedicels 2 to 6 mm. long; bracteoles 0.5 mm. long; calyx with rounded-triangular tips, 1.5 mm. long; tube of corolla puberulent outside, hirsute inside, about 2 mm. long, lobes of equal length or slightly shorter; stamens inserted on lower half of tube, glabrous; carpels separate, style cleft for about the first third of its lower length; follicles cylindrical, apiculate, smooth or very finely striate longitudinally, 7 to 13 cm. long; seeds flattened, obovate-elliptic, delicately ciliate.

Around San Salvador, Salvador, altitude 800 to 1,000 meters, Carlos Renson, no. 289, 1905, flowers; no. 335, 1906, fruit (both U. S. National Herbarium).

EXPLANATION OF PLATE IX.—Leafy branch and fruit, one-half natural size; pistil, seed, bud, and stamen variously magnified.

Specimens with flowers were first received and, not being able to identify them myself satisfactorily, I had them forwarded to Captain Donnell Smith, who, misled by the very similar floral structure, described them as a new species of the genus Rauwolfia. Meanwhile I had been studying no. 11619 of the herbarium of the Instituto físico-geográfico de Costa Rica, arriving at the conclusion that it belonged to an undescribed genus. About the time Mr. Donnell Smith published his new species I was greatly surprised to receive from Doctor Renson a fruiting specimen of the Salvadorean plant, which showed at a glance Captain Donnell Smith's mistake, and also the close affinity of his *Rauwolfia stenophylla* to my *Tonduzia parvifolia*.



TONDUZIA STENOPHYLLA (DONNELL SMITH) PITTIER.

A COLLECTION OF PLANTS FROM THE VICINITY OF LA GUAIRA, VENEZUELA.

By J. R. Johnston.

INTRODUCTORY NOTES.

In 1900 Capt. Wirt Robinson, of the United States Army, and Dr. M. W. Lyon, jr., of the United States National Museum, spent six weeks in the vicinity of La Guaira collecting for the most part specimens of animals. Incidentally they were able to gather together about 60 plants, which were sent to the United States National Herbarium, and most of which have recently been turned over to me for identification.

The plants in the following list were all collected near La Guaira, Macuto, and San Julian. Macuto is about 5 kilometers to the east of La Guaira on the coast, and San Julian is about 12 kilometers to the east of La Guaira and nearly 1½ kilometers from the shore. For a description of the topography, temperature, and rainfall of this region one should refer to "An annotated list of mammals collected in the vicinity of La Guaira, Venezuela," by Robinson and Lyon, in the Proceedings of the National Museum.[a]

It is sufficient to say in this connection that the shore rises abruptly to an altitude of over 2,500-meters immediately above La Guaira, and that the exposed hills are barren or covered with a dry shrubbery, the low valleys with palms and other trees, and the high gorges with a great luxuriance of tropical vegetation. The very narrow littoral plain is clothed with a typical desert vegetation of cacti, crotons, lantanas, etc.

In addition to the list of Robinson and Lyon's plants it has seemed well worth while to include under each species notes of its further occurrence in Venezuela as determined from other collections. It should be noted that the plants of Fendler, of Birschel, and of Rusby and Squires here cited as occurring in Venezuela have not before been published upon, at least so far as I can ascertain. The notes made here are obtained from reference to the plants at the United States National Herbarium and at the Gray Herbarium of Harvard University.

[a] **24**: 135–162. 1901.

The identification of the plants shows five species which are new to science. As far as can be ascertained, nine of the remaining species have never been recorded from Venezuela, and three have never before been collected there, these being *Phoradendron trinervium*, *Corchorus pilobolus*, and *Marsdenia maculata*. The remainder of the nine are in the collections that have not been reported upon.

LIST OF SPECIES.

BROMELIACEAE.

Pitcairnia sp.

La Guaira, *Robinson & Lyon*, July 11.

Tillandsia utriculata L. Sp. Pl. 286. 1753.

Macuto, *Robinson & Lyon*, August 9; Cumaná, according to H.B.K. Nov. Gen. & Sp. 7: 293; Margarita, *Ernst*, 1876, and *Johnston*, 1903.

Further distribution, West Indies.

Tillandsia sp.

San Julian, *Robinson & Lyon*, July.

Allied to *T. juncea* Lec. and *T. tenuifolia* L.

MUSACEAE.

Heliconia bihai L. Mant. 211. 1767.

San Julian, *Robinson & Lyon*, July 20; Margarita, *Johnston*, 1903.

Distribution, general in tropical America.

PIPERACEAE.

Piper sp.

La Guaira, *Robinson & Lyon*, July 6.

Shrub 2 to 3 meters high.

LORANTHACEAE.

Phoradendron trinervium (Lam.) Nutt. in Journ. Acad. Phil. n. s. 1: 185. 1848.

San Julian, *Robinson & Lyon*, July 18.

West Indies, Venezuela according to Grisebach.

Phoradendron sp.

San Julian, *Robinson & Lyon*, July 18.

Allied to *P. tetrastachyum* Griseb.

URTICACEAE.

Urera alceaefolia (Poir.) Gaud. in Freyc. Voy. Bot. 497. 1826.

La Guaira, *Robinson & Lyon*, July 11.

Distribution, general in tropical America.

MIMOSACEAE.

Acacia tamarindifolia Willd. Sp. Pl. 4: 1092. 1805.

Small tree, dry hills, La Guaira, *Robinson & Lyon*, July 12; Margarita, *Miller & Johnston*, 1901, *Johnston*, 1903; Bordones, according to H.B.K. Nov. Gen. & Sp. 7: 310.

Further distribution, Martinique, Cumaná, and Caracas.

Calliandra sp.

San Julian, *Robinson & Lyon*, July 17.

CAESALPINIACEAE.

Cassia oxyphylla Kunth, Mim. 129. *pl. 39.* 1819.

La Guaira, *Robinson & Lyon*, July 6; Mount Cocollar, according to H.B.K. Nov. Gen. & Sp. **7**: 311; Margarita, *Miller & Johnston*, 1901.

Further distribution, Colombia.

FABACEAE.

Bradburya virginiana (L.) Kuntze, Rev. Gen. Pl. **1**: 164. 1891.

La Guaira, *Robinson & Lyon*, July 11; Margarita, *Miller & Johnston*, 1901.

Further distribution, temperate and tropical American and Niger.

Mucuna flagellipes Vog.; Benth. in Hooker, Niger Flora 307. 1849.

Climbing vine along stream, San Julian, *Robinson & Lyon*, July 18; Colonia Tovar, *Fendler*, no. 266, 1854–5.

Fendler's specimen is similar to the type. Robinson and Lyon's specimen, however, though approaching it closely, shows some variations. The bracts are entire instead of tridentate. Taubert[a] places *M. flagellipes* in the section of plants having oblique cross lamellæ on the pods. In this specimen the lamellæ are very obscure, having given place to flat or lamellate tubercles which lie in distinct oblique rows. In other respects the material agrees with typical specimens.

MELIACEAE.

Trichilia spondioides Jacq. Enum. Pl. Carib. 20. 1762.

La Guaira, *Robinson & Lyon*, July 12. Shrub, 4 to 5 meters high.

Further distribution, Jamaica, Cuba.

POLYGALACEAE.

Securidaca ovata Johnston, sp. nov.

Shrub, ascending?; leaves widely ovate, occasionally elliptical, glabrous above, finely puberulent on the main veins underneath, with entire margin, rounded or slightly emarginate base, and obtuse or minutely retuse apex; blade 4 to 7 cm. long, 3 to 5 cm. wide; petiole 3 to 5 mm. long, puberulent; stipules unknown but stipular scars present; inflorescence racemose, lateral, 5 to 10 cm. long and bearing 8 to 20 flowers; bracts subulate, pubescent, 2 mm. long; pedicel slender, pubescent, 5 to 14 mm. long; sepals 5, 2 equal, oval, slightly concave, 1 cm. long, the third a little larger and distinctly carinate, puberulent within, the 2 inner sepals corolline, broad, obovate, shortly unguiculate, 12 mm. long, glabrous; the 2 petals of the keel falcate, shortly unguiculate; lip elliptical, the end folded with a dentate margin; stamens 8, adherent to corolla tube, which is cleft at one side; ovary glabrous, flattened; style a little longer than stamens; fruit with wing 4.5 cm. long; dorsal part of carpel prolonged into a small hook curved toward the wing.

San Julian, *Robinson & Lyon*, July 18. Several other species are close to this one in the shape of the leaf. All are distinct, however, in the form of the fruit.

Type specimen, no. 531790, U. S. National Herbarium.

EUPHORBIACEAE.

Hura crepitans L. Sp. Pl. 1008. 1753.

La Guaira, *Robinson & Lyon*, July 13; Margarita, *Ernst*, 1876.

Distribution, general in tropical America.

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[a] Engl. & Prantl, Pflanzenfam. 3^5: 366.

Jatropha urens stimulosa Müll. Arg. in DC. Prod. **15**[2]: 1100. 1873–4.

La Guaira, *Robinson & Lyon*, July 12; Margarita, *Ernst*, 1876; *Miller & Johnston*, 1901; *Johnston*, 1903.

Distribution, wide in tropical America.

Pedilanthus tithymaloides Poit. Ann. Mus. Par. **19**: 390. *pl. 19*. 1812.

La Guaira, *Robinson & Lyon*, July 6; Cumaná, according to H.B.K. Nov. Gen. & Sp. **7**: 295; Margarita, *Ernst*, 1876, and *Miller & Johnston*, 1901.

Distribution, northern South America.

Phyllanthus acuminatus Vahl, Symb. Bot. **2**: 95. 1791.

La Guaira, *Robinson & Lyon*, July 6, July 11; Caracas, *Birschel*.

Small tree.

Distribution, general in tropical America.

TILIACEAE.

Corchorus pilobolus Link, Enum. Hort. Berol. **2**: 72. 1822.

La Guaira, *Robinson & Lyon*, July 6.

Distribution, tropical and subtropical America.

MALVACEAE.

Abutilon crispum Sweet, Hort. Brit. ed. I. 53. 1827.

San Julian, *Robinson & Lyon*, July 19; Colonia Tovar, *Fendler*, 1854–5; Margarita, *Miller & Johnston*, 1901; *Johnston*, 1903.

Further distribution, tropical America and East India.

BEGONIACEAE.

Begonia sp.

La Guaira, *Robinson & Lyon*, July 6.

Related to *B. acuminata* Dryand.

MELASTOMACEAE.

Clidemia sp.

La Guaira, *Robinson & Lyon*, July 6.

Small tree.

APOCYNACEAE.

Plumiera caracasana Johnston, sp. nov.

Shrub 3 meters high; stem thick, at the base of the inflorescence 1.5 to 2 cm. in diameter, tuberculous from numerous raised leaf scars; leaves numerous, spatulate or oblanceolate, glabrous above, and either glabrous below or pilose at the main veins, with midrib and secondary veins prominent on the underside (20 to 30); blade with entire margin, a broadly acute or obtuse apex, and a cuneate base decurrent into the petiole, from 2.5 cm. wide and 7 cm. long to 6 cm. wide and 21 cm. long; petiole lacking or as much as 0.5 cm. in length; inflorescence cymose; common peduncle 7 to 12 cm. long, thick, glabrous; pedicels pilose, 1 cm. long; bracts minute, less than 1 mm. long, more than 2 mm. wide, upper edge curved, apiculate; calyx 5-lobed; 3 lobes broad, rounded, apiculate, the 2 others oval; lobes about 1 mm. long; corolla white, glabrous externally; tube slender, densely pilose within, 3 cm. long; corolla lobes obovate, rounded, equaling tube; follicle 12 cm. long and 2 wide; seeds with wing at apex, obliquely placed.

Between Caracas and La Guaira, altitude 500 meters, *Fendler*, no. 1026, August 16, 1855; La Guaira, *Robinson & Lyon*, July 13, 1900; Margarita, *Miller & Johnston*, 1901.

Type specimen, no. 531827, U. S. National Herbarium (*Robinson & Lyon*).

Tabernaemontana grandiflora Jacq. Enum. Pl. Carib. 14. 1762.

La Guaira, *Robinson & Lyon*, July 6; between La Guaira and Caracas, *Fendler*, no. 1027, August, 1855.

Further distribution, Colombia.

ASCLEPIADACEAE.

Calotropis procera (Willd.) Dryand. in Ait. Hort. Kew. ed. 2. **2**: 78. 1811.

La Guaira, *Robinson & Lyon*, July 4; La Guaira, *Fendler*, 1855; Margarita, *Ernst*, 1876; *Miller & Johnston*, 1901.

Further distribution, East India and tropical America.

Marsdenia maculata Hook. Bot. Mag. **73**: *pl. 4299*. 1847.

La Guaira, *Robinson & Lyon*, July 6; Margarita, *Miller & Johnston*, 1901; *Johnston*, 1903.

Further distribution, Mexico, Colombia, Trinidad, and Panama.

Marsdenia robinsoni Johnston, sp. nov.

Shrubby, climbing; stem slender, puberulent; leaves opposite, elliptical, attenuate at both ends, acuminate at apex, main veins puberulent, otherwise glabrous on both sides, membranaceous; margin entire; petiole puberulent, 1 cm. long; inflorescence axillary, umbellate; umbel sessile or subsessile with 2 or 3 minute bracts; calyx rotate, deeply 5-lobed, externally slightly puberulent, internally glabrous, with margin distinctly ciliate; lobes ovate with rounded apex; minute setaceous glands or appendages alternating with the sepals; corolla rotate, slightly whirled, 5-parted; lobes oval or elliptical-oval, the apex rounded, 4 mm. long, about twice the length of the calyx; small fleshy appendages between the lobes of the corolla; corona fleshy, 5-leaved, each leaf 2-lobed, equaling or shorter than the anthers, the lobes rounded, adnate to anther tube; corona and anther just equaling stigma; terminal appendage of the anther cymbiform, inflexed; apparently also 2 minute lateral appendages; style slightly convex; fruit unknown.

La Guaira, *Robinson & Lyon*, July 27. Distinct from most Marsdeniae by rotate corolla and sessile inflorescence.

Type specimen, no. 531794, U. S. National Herbarium.

CONVOLVULACEAE.

Ipomoea biloba Forsk. Fl. Aegypt. Arab. 44. 1775.

Macuto, *Robinson & Lyon*, July 16; Colonia Tovar, *Fendler*, 1854–55; Margarita, *Ernst*, 1876.

Widely distributed in tropical countries.

BORAGINACEAE.

Cordia cylindristachya Roem. & Schult. Syst. **4**: 459. 1819.

La Guaira, *Robinson & Lyon*, July 17; Margarita, *Ernst*, 1876; *Miller & Johnston*, 1901; *Johnston*, 1903.

Distribution, tropical America.

VERBENACEAE.

Lantana camara L. Sp. Pl. 627. 1753.

Low shrub, dry ground, San Julian, *Robinson & Lyon*, July 17; Colonia Tovar, *Fendler*, no. 860 (part), January 31, February 23, 1854; Sacupano, *Rusby & Squire*, no. 41, and Paloma, *Rusby & Squire*, no. 312, April, 1896; Margarita, *Miller & Johnston*, 1901; Caracas, *A. H. Moore*, March 16, 1899.

Distribution, tropical America.

Lantana sp.

Dry hills, La Guaira, *Robinson & Lyon*, July 13.

Lantana sp.

San Julian, *Robinson & Lyon*, July 17.

BIGNONIACEAE.

Distictis robinsoni Johnston, sp. nov.

Shrubby, climbing; stem striate; leaves opposite, 2 or 3-foliate, the middle leaflet often giving place to a tendril; leaves broadly lanceolate with obtuse base and attenuate or acuminate apex, the midrib sometimes projecting very slightly; margin entire; leaves membranaceous, not veiny, glabrous on both sides, from 2 cm. wide and 4 cm. long to 3.25 cm. wide and 8.5 cm. long; petiole 1.5 to 5 cm. long, often minutely pubescent; petiolule 0.5 to 3 cm. long; disk-like glands often present at apex of petiole and apex of the peduncle; a pair of obovate stipule-like leaves at the base of the petiole, 3 mm. long and 1.5 mm. wide; inflorescence axillary, 2-flowered; peduncle 2 to 3 cm. long; pedicel 0.5 cm. long; flower glabrous; calyx campanulate, truncate, 6 to 7 mm. long; corolla slender, cylindrical for a length of 1 to 1.5 cm., then expanding into a bell-shaped form, oblique or bending slightly to one side; corolla tube altogether 4 to 5 cm. long, 5-lobed, the lobes subequal; stamens 4, perfect, 1 staminodium equaling the stamens; anthers diverging, glabrous; disk very wide; fruit unknown.

La Guaira, *Robinson & Lyon*, July 15, 1900.

Type specimen, no. 531779, U. S. National Herbarium.

Tecoma chrysantha (Jacq.) DC. Prod. **9**: 221. 1845.

Small tree in dry hills, La Guaira, *Robinson & Lyon*, July 15, 1900; near Caracas, according to Jacquin, Hort. Schoenbr. **2**: 45.

Further distribution, Colombia (*H. H. Smith*, no. 1140, 1898–1901).

ACANTHACEAE.

Stenandrium lyoni Johnston, sp. nov.

Acaulescent; leaves subrosulate, petiolate, oval or elliptical-oval, scabrous on both sides and scatteringly pilose, lighter green on under side, with entire ciliate margin, rounded apex, and truncate base, 2.5 cm. wide and 4 cm. long; mid-vein and about 4 pairs of lateral veins prominent on under side; petiole 0.5 to 1 cm. long; scape 2 to 10 cm. high; bracts 1-flowered, strigose-pubescent, narrowly lanceolate or linear-lanceolate, 9 mm. long; bracteoles 2, narrowly lanceolate, a little more than one-half the length of the calyx; calyx deeply 5-cleft, lobes linear-lanceolate with acuminate apex, 4 mm. long; corolla 5-lobed; lobes subequal, oval-elliptical; stamens 4, included; anthers 1-celled, the cells pubescent at apex; ovary ellipsoidal, glabrous; stigma fimbriate.

San Julian, *Robinson & Lyon*, July 18, 1900.

Type specimen, no. 531791, U. S. National Herbarium.

RUBIACEAE.

Hamelia patens Jacq. Enum. Pl. Carib. 16. 1762.

La Guaira, *Robinson & Lyon*, July 3; Colonia Tovar, *Fendler*, no. 591, 1854–55.

A shrub, half-climbing.

Robinson and Lyon's specimen is nearly glabrous throughout except on young parts. Fendler's specimen is pubescent throughout with the exception of the upper surface of the leaves.

Distribution, tropical America.

Pogonopus exsertus Oerst. Act. Soc. Hist.-nat. Havn. 45. 1852, according to A. S. Oersted, L'Amérique Centrale **1863**: 17. *pl. 13.*

La Guaira, *Robinson & Lyon*, July 11, 1900; Colonia Tovar, *Fendler*, No. 584, 1854–55.

Shrub.

Further distribution, Costa Rica.

CARDUACEAE.

Eupatorium ballotaefolium H.B.K. Nov. Gen. & Sp. **4**: 121. 1820.

Dry hills, La Guaira, *Robinson & Lyon*, July 12; Colonia Tovar, *Fendler*, no. 653, 1854–55; Margarita, *Miller & Johnston*, 1901; *Johnston*, 1903.

Shrub 1 to 1.5 meters.

Further distribution, Colombia, Brazil, and Santo Domingo.

Eupatorium macrophyllum L. Sp. Pl. ed. 2. 1175. 1763.

La Guaira, *Robinson & Lyon*, July 6; Colonia Tovar, *Fendler*, no. 644, 1854–55.

Distribution, general in tropical America.

Stemmodontia caracasana (DC.)

Wedelia caracasana DC. Prod. **5**: 541. 1836.

La Guaira, *Robinson & Lyon*, July 6; Caracas, *Vargas*, no. 97, 1829; *Birschel; A. H. Moore*, March 16, 1899; Colonia Tovar, *Fendler*, nos. 682, 683, 1854–55, and no. 1961, January 25, 1857; Margarita, *Johnston*, 1903.

Further distribution, Trinidad, Panama, and Venezuela.

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SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM

CONTRIBUTIONS

FROM THE

UNITED STATES NATIONAL HERBARIUM

VOLUME XII, PART 3

TYPES OF AMERICAN GRASSES:

A STUDY OF THE AMERICAN SPECIES OF GRASSES DESCRIBED BY LINNÆUS, GRONOVIUS, SLOANE, SWARTZ, AND MICHAUX

By A. S. HITCHCOCK

WASHINGTON
GOVERNMENT PRINTING OFFICE
1908

BULLETIN OF THE UNITED STATES NATIONAL MUSEUM

ISSUED JUNE 18, 1908

PREFACE.

The accompanying paper, by Prof. A. S. Hitchcock, Systematic Agrostologist of the United States Department of Agriculture, entitled "Types of American grasses: a study of the American species of grasses described by Linnæus, Gronovius, Sloane, Swartz, and Michaux," is an important contribution to our knowledge of American grasses.

It is regarded as of fundamental importance in the critical systematic investigation of any group of plants that the identity of the species described by earlier authors be determined with certainty. Often this identification can be made only by examining the type specimen, the original description being inconclusive. Under the American code of botanical nomenclature,[a] which has been followed by the author of this paper, "the nomenclatorial type of a species or subspecies is the specimen to which the describer originally applied the name in publication."

The procedure indicated by the American code, namely, to appeal to the type specimen when the original description is insufficient to identify the species, has been much misunderstood by European botanists. It has been taken to mean, in the case of the Linnæan herbarium, for example, that a specimen in that herbarium bearing the same name as a species described by Linnæus in his Species Plantarum must be taken as the type of that species regardless of all other considerations. In point of fact, the specimen preserved in the herbarium of Linnæus is often not the type specimen of the species whose name it bears. Linnæus sometimes based a species on the figure and description of an older author, but by mistake placed in his herbarium a specimen belonging to a similar but distinct species. He sometimes failed to preserve the specimen on which one of his species was based, but later preserved some other specimen incorrectly referred to the species. To consider such specimens types would be quite contrary to the letter and the intent of the American code.

An examination of the methods pursued by Professor Hitchcock in locating and identifying the type specimens of American grasses

[a] Printed in Bull. Torr. Club **34**: 167–178. 1907.

in European herbaria is earnestly commended to those botanists who are not familiar with the method of types or who are opposed to its application.

Opportunity was given by various curators for the examination of specimens in their charge. Acknowledgment is made, however, to B. Daydon Jackson, Carl A. M. Lindman, P. H. Lecomte, and A. B. Rendle for special courtesies and assistance rendered by them in facilitating the examination of collections in their charge.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

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TYPES OF AMERICAN GRASSES: A STUDY OF THE AMERICAN SPECIES OF GRASSES DESCRIBED BY LINNÆUS, GRONOVIUS, SLOANE, SWARTZ, AND MICHAUX.

By A. S. Hitchcock.

INTRODUCTION.

During the spring of 1907 I had the opportunity of examining many types of American species of grasses deposited in European herbaria. In the present paper I have considered the species of grasses described by Linnæus, Gronovius, Sloane, Swartz, and Michaux, the first only so far as they are based upon American material. No attempt is made to determine the types of Old World species.

Since the older authors did not indicate their types, these must be determined from the records which have been preserved. The type specimen is the specimen or one of the specimens from which the author drew up the description. The specimen often supplements or interprets the description. If the author mentions in his original description a definite specimen, if this specimen has been preserved and its identity certified by the data upon the label and by the name of the species added by the author, it is clear that this specimen is the type. However, it often happens that the evidence is less complete. An author may have based his description upon more than one plant (*Panicum pubescens* Lam., see page 147); the supposed type may not agree perfectly with the description (*Andropogon ischaemum* L., page 126); the author may have written the name upon more than one sheet or upon a sheet which is not mentioned in the description (*Panicum latifolium* L., page 118); the locality or other data on the label of the type specimen may not agree with that published (*Zizania fluitans* Michx., page 156); the type specimen may have been sent to another herbarium (*Panicum dichotomiflorum* Michx., page 147); the type specimen may be accompanied by a specimen of a different species upon the same sheet (*Panicum dichotomum* L., page 117); or the type specimen may bear a name on the label which is different from the one published (*Chloris monostachya* Michx., page 152); or

there may be several specimens from which the type must be selected by comparison with the description (*Panicum barbulatum* Michx., page 148). These and other difficulties complicate the study and make it necessary to examine carefully all the evidence. This evidence not infrequently shows that a species has been misunderstood. The original description may be insufficient to identify the species, but the identity can be established by the type specimen (*Panicum nitidum* Lam., page 148). Tradition may have attached a name to one species, while the description and the type specimen show that the name belongs to another species (*Cenchrus tribuloides* L., page 127; *Agrostis aspera* Michx., page 150).

In the following account I have considered each case upon its merits and have presented the evidence upon which I have based my decision. It will be seen that usually the apparent difficulties disappear and we are able to determine the specimen the author had chiefly in mind when he wrote the description. The earlier authors, especially Linnæus, frequently cited descriptions or plates which they considered as referring to the same plant they were describing. Linnæus even based his binomial upon the description or plate of another author. If an author quotes the diagnosis of a species described by another author and gives a name to this, but has no description of his own, the type of the older author becomes the type of the later (*Panicum capillare*, L., page 118). Linnæus often gave binomial names to species described by others. But if Linnæus wrote a description and there has been preserved a specimen which the evidence shows must have been seen by him when he drew up the description, this specimen is the type, and not the specimen which is the basis of the synonym (*Panicum latifolium* L., page 118; *Paspalum paniculatum* L., page 116). The danger of placing too much weight upon cited synonyms as evidence is shown by the fact that Linnæus sometimes cited a given Sloane plate under different species in different works or even in the same work (*Panicum sanguinale* L., page 117); or the synonyms may be quite different from the species under which they are cited (*Andropogon nutans* L., page 125).

Fortunately the grasses left us by the older authors, though often fragmentary, are in a satisfactory state of preservation, and it is usually possible to determine their identity with certainty.

THE AMERICAN GRASSES DESCRIBED BY LINNÆUS.

The herbarium of Linnæus, preserved at the rooms of the Linnæan Society of London, Burlington House, Piccadilly, contains most of his types. In the following article I have considered only those species based wholly or in part upon American material, nearly all of which was furnished by Kalm, Gronovius, Sloane, or Browne. In the case of Old World species the specimens preserved by Linnæus

may not be type specimens, as he often applied a binomial to a species already well known, but his American species may usually be traced back to definite type specimens. The specimens from Kalm are marked by Linnæus with a small "K." These specimens are credited to Canada by Linnæus, but Kalm traveled as far south as Pennsylvania and New Jersey. The specimens from Patrick Browne in Jamaica are marked "Br." The Gronovius specimens were collected by Clayton and are described in Gronovius's Flora Virginica. When Linnæus quotes Gronovius's diagnosis, Gronovius's species is the type and is represented by a specimen in the British Museum. Often Linnæus has a specimen in his own herbarium received from Gronovius which he describes, citing Gronovius as a synonym. In such cases the Linnæan specimen is the type. Linnæus often cites Sloane's plates, but only occasionally quotes his diagnoses. Sloane's specimen is the type only when Linnæus quotes Sloane's diagnosis and has no description of his own. In all cases it must be evident that Linnæus drew up his description wholly or in part from the preserved specimen, which then becomes the type.

Cinna arundinacea L. Sp. Pl. 5. 1753.

This is the species as described in our manuals. The spikelets are nearly 5 mm. long. Linnæus states in his description that Kalm obtained the seed in Canada. The sheet is marked "H U."[a]

Phalaris oryzoides L. Sp. Pl. 55. 1753.

There are two sheets, both bearing the name in the handwriting of Linnæus. One of these has a small label pasted on one corner of the sheet, "Gramen miliaceum Vol. 1, pag. 350. n. 1." This, which is clearly the type, is *Homalocenchrus oryzoides* (L.) Poll. Munro states that this specimen is from Gronovius. The type locality of the species, as given by Linnæus, is Virginia. The second sheet, on the other hand, marked "Br" and therefore from Jamaica, is *Homalocenchrus hexandrus* (Sw.) Kuntze. Sloane's plate 71, figure 1, cited later by Linnæus[b] is an Eragrostis.

Panicum dissectum L. Sp. Pl. 57. 1753.

Upon this sheet Linnæus wrote "*dimidiatum,*" which is crossed out, and "*dissectum;*" also "K." The plant is what has been called *Paspalum membranaceum* Walt. Spikes 4, with others hidden in the sheath; spikelets 2 mm. long.

In determining the type of *Panicum dissectum* L. several points must be taken into consideration. Linnæus describes the plant as follows, "Panicum spiculis alternis; rachi lineari membranacea extrorsum imbricato-florifera." This applies to the herbarium specimen. The first synonym cited is "Dactylis spicis alternis numerosis patulis, calycibus unifloris. Roy. lugdb. 56." The character "spicis numerosis" does not apply to the Linnæan specimen. The second synonym, Plukenet, "Mant. 94. t. 350. f. 2" (from America), can scarcely be the same as the specimen of Linnæus, for the blades of the figure are long and gradually narrowed to a point. The third synonym is a citation from Sloane, Hist. Jam. **1:** 112. *pl. 69. f. 2.* This is the plant now called *Paspalum virgatum*, as shown by the plate and by the specimen preserved in the British Museum. The same plate is cited by Linnæus under *Andropogon fascicu-*

[a] An abbreviation for Hortus Upsalensis, indicating that the specimen was cultivated in that botanical garden.

[b] Sp. Pl. ed. 2. 81. 1762.

latum.[a] The habitat of *Panicum dissectum* is given by Linnæus as "in Indiis." We obtain more light by noting how Linnæus disposed of the species in subsequent works. The next reference is in the tenth edition of his Systema Naturae[b] where the genus Paspalum is established. The first species is *dimidiatum*, "P. spicis subsolitariis, pedunculo communo membranaceo. *Panicum dissectum*, Sp. Pl. 57. n. 6." Although he bases the new name upon *Panicum dissectum*, he changes the specific name to *dimidiatum*. As his species of Panicum No. 7 in the first edition was called *P. dimidiatum*, and there is no doubt that this is what we now call *Stenotaphrum dimidiatum*, Linnæus apparently became confused, or inadvertently transferred the wrong name. The real *Panicum dimidiatum* is omitted in the tenth edition of the Systema, but reappears in the second edition of the Species Plantarum. That Linnæus made a slip of the pen in his citation of 1759 is shown by the fact that in the second edition of his Species Plantarum[c] he restores the name *dissectum* and we have *Paspalum dissectum* based on *Panicum dissectum* of the first edition. Plukenet's figure is still cited, but the other synonyms are omitted. Sloane's plant was taken out and given the name *Paspalum virgatum* L.[d] and the same disposition was made of it in the second edition of the Species Plantarum. In the latter work Linnæus changes the habitat of *Paspalum dissectum* to "America calidiore," and adds a further description which certainly applies to the specimen from Kalm rather than to any of the others under consideration, "Gramen prostratum foliosum vaginis fere spathaceis. Spicae paucae rachi membranacea dilatata ad latitudinem spicae ipsius distichae & secundae. Flores orbiculati."

From the above it seems clear that Linnæus had Kalm's plant before him when he wrote his description of 1753, but that he erred in his synonyms. We must not place too much weight upon the localities, Indies and America calidiore, for at that time there was little knowledge concerning the distribution of American plants. *Paspalum scrobiculatum* L.[e] from "India orientali" has been considered by some a synonym of *P. dissectum* (as Hooker in Fl. Br. Ind. **7:** 11. 1896), but I am unable to find any evidence to support this disposition.

It seems proper that we should regard Kalm's specimen in Linnæus's herbarium as the type of *Panicum dissectum* L. and that this name should be taken up for the plant we have been calling *Paspalum membranaceum* Walt., which becomes *Paspalum dissectum* (L.) L.

Paspalum virgatum L. Syst. Nat. ed. 10. **2:** 855. 1759.

The specimen is from "Br" and is the same as the Sloane plant referred to unde the preceding species. The plant from Browne is the type, for, although Linnæus cites Sloane's plate 69, figure 2 under this species,[f] he does not quote Sloane's diagnosis but gives one of his own.

Paspalum paniculatum L. Syst. Nat. ed. 10. **2:** 855. 1759.

The plant is what has been going under that name in the floras of tropical America. Linnæus here cites Sloane's plate, but uses his own diagnosis, which is quite different from that of Sloane. His description "P. paniculae spicis inferioribus subgeneris basi villosis," certainly applies to his own plant received from Browne rather than to the Sloane plant or plate. I can not agree with Mr. Nash, who makes Sloane's plant (which is *Panicum fasciculatum* Sw.) the type of this species, and hence calls it *Panicum paniculatum* (L.) Nash.[g] This combination could not be used in any case on account of *Panicum paniculatum* (L.) Kuntze,[h] which is based on *Paspalum paniculatum* L., without regard to its identity.

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[a] Sp. Pl. ed. 2. 1483. 1762.
[b] **2:** 855. 1759.
[c] 81. 1762.
[d] Syst. Nat. ed. 10. **1:** 855. 1759.
[e] Mant. **1:** 29. 1767.
[f] Loc. cit.; also Sp. Pl. ed. 2. 81. 1762.
[g] Bull. Torr. Club **30:** 381. 1903.
[h] Rev. Gen. **3:** 363. 1898.

Paspalum distichum L. Syst. Nat. ed. 10. **2:** 855. 1759.

There is no indication on the sheet as to the source of the specimen, though Munro states that it is from Browne. The specimen belongs to this species as generally understood. Spikes 2 or 3; spikelets 3 mm. long, acute, pubescent on the convex side.

Panicum glaucum L. Sp. Pl. 57. 1753.

The type and form β are from the Old World but γ is based on "Panicum spica simplici, aristis aggregatis flosculo subjectis. Gron. virg. 134." This last form is represented by Clayton no. 579 and is the ordinary form of *Chactochloa glauca* (L.) Scribn.

Panicum crusgalli L. Sp. Pl. 56. 1753.

One sheet marked "K" is the ordinary small form of this species. This specimen must be considered the type, since it agrees with the description and is the only one to which Linnæus has attached the name. Pinned to this are two other sheets both from Gronovius. One is the large-panicled, short-awned form, with stout erect culms and is the same as the plant in the Gronovius herbarium, cited in Gron. Fl. Virg. as Clayton no. 591, and bears the label, "591 panicum arvense paniculis fuscis densioribus glumis hispidis aristis brevioribus," which is quoted by Gronovius. On the second sheet is the large-panicled, long-awned form with hispid sheaths, now called *Echinochloa walteri* (Pursh) Nash. It bears the label, "579 pl. 2 Panicum arundinaceum spica ampla densa hispida purpurea longis aristatis Clayt.," which is mentioned by Gronovius,[a] who also quotes the Bauhin citation given by Linnæus under β. This is, therefore, the specimen upon which the locality "Virginiae cultis" is based and represents Linnæus's idea of *Panicum crusgalli* β.

Panicum sanguinale L. Sp. Pl. 57. 1753.

The specimen upon which Linnæus has written the name is marked "H U" and is the ordinary form of this species, *Syntherisma sanguinalis* (L.) Dulac, as is another sheet pinned to this with a citation from Sloane. Linnæus cites "Gron. virg. 154," in his description. The plant, Clayton no. 457, could not be found at the British Museum, but there is no doubt that Gronovius was describing our ordinary crab-grass—a name which he uses. Linnæus also cites "Sloan. Hist. 1, p. 113. t. 70. f. 2," a synonym which, however, does not affect the identity of the type. In Sloane's herbarium two specimens are covered by this citation. One is *Leptochloa virgata* (L.) Beauv., the other *L. mucronata* (Michx.) Kunth, but the plate is taken from the former. This plate is cited under *Cynosurus virgatus* in the Systema Naturae,[b] and under both *Cynosurus virgatus* (page 106) and *Panicum sanguinale* (page 85) in the second edition of the Species Plantarum (1762).

Panicum filiforme L. Sp. Pl. 57. 1753.

The sheet taken as the type is marked "K" and is the ordinary form, *Syntherisma filiformis* (L.) Nash. A second sheet, also marked "K," has this and a specimen of *Muhlenbergia schreberi* Gmel. A third sheet marked "H U" is *Syntherisma sanguinalis* (L.) Dulac.

Panicum dichotomum L. Sp. Pl. 58. 1753.

Linnæus's specimen, marked "K", is *Panicum microcarpon* Muhl. (*P. barbulatum* of our manuals, not Michaux). Nodes barbed, spikelets 1.5 mm. long. Munro states that this is "the plant described by A. Gray as *dichotomum.*" The latter, however, has smooth nodes and spikelets 2 mm. long. It should be noted that since Linnæus gives no description of his own but quotes that of Gronovius the plant of Gronovius becomes the type. Gronovius's specimen (Clayton no. 458) consists of two plants, one of which is the *P. dichotomum* of our manuals and the other *P. oligosanthes* Schultes. The description applies better to the former, which should therefore be taken as the type. This retains the name in the traditional sense.

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[a] Fl. Virg. ed. 2. 13. 1762.

[b] Ed. 10. **2:** 876. 1759.

Panicum clandestinum L. Sp. Pl. 58. 1753.

The type, from "K", is the autumnal state of this species as commonly understood. Linnæus also cites Sloane, Hist. **1**: 120. *pl. 80*, which is *Hackelochloa granularis* (L.) Kuntze (*Manisuris granularis* Sw.), but the description of Linnæus does not apply to this.

Panicum capillare L. Sp. Pl. 58. 753.

The specimen is from "H U." Since Linnæus gives no description of his own, but bases the name on "Gron. virg. 13," the type is Clayton no. 454. This, which is the same as the Linnæan plant, is the broad-leaved form with ample panicle, as described in Britton's Manual. Linnæus's citation [a] of Sloane [b] is *Panicum trichoides* Sw. A specimen in the Stockholm herbarium marked "K" by Linnæus is *P. philadelphicum* Bernh.

Panicum latifolium L. Sp. Pl. 58. 1753.

There are two plants from "K" upon the sheet on which Linnæus has written the name. The left-hand plant is *Panicum macrocarpon* LeConte; the right-hand plant is *Panicum clandestinum* L., both in the vernal state. Pinned to this is a sheet of *Panicum divaricatum* L., but Linnæus has not written the name upon this. There is also a third sheet upon which Linnæus has written the name and "Br." This is *Panicum oryzoides* Sw., but it should be excluded from consideration, as Linnæus appears to have received Browne's plants after he prepared his Species Plantarum; at least he does not cite Browne's specimens in the first edition. Linnæus [c] cites Sloane, Hist. Jam. **1**: 114. *pl. 71. f. 3*, the species referred to being now called *Panicum sloanei* Griseb. It is the broad-leaved form with large panicle as distinguished from *P. divaricatum* L. Linnæus [d] gives a rather extended description, which applies to the first sheet mentioned above and not to the others. It would apply, I think, to either of the two plants upon this sheet, but rather better to the left-hand plant (*P. macrocarpon* LeConte). It has wider blades and the hairs around the base of the blades are as described: "Folia latitudine Commelinae ad fauces amplexicaulia; extus collo circum fauces villoso, etiam basi foliorum margine pilosa." Furthermore, he has already described *Panicum clandestinum*. The left-hand plant is therefore taken as the type and the name *Panicum latifolium* L. will stand for what we have been calling *Panicum macrocarpon* LeConte. Some botanists have applied the name *P. latifolium* to the Sloane plant, but Sloane's polynomial is a synonym incorrectly cited. It should be noted that Sloane's polynomial is the second synonym given by Linnæus, the first being from Morison's History, which probably is *P. boscii*, but certainly is not the Sloane species. The plant described as *Panicum latifolium* by Gray and other early American botanists differs from *P. macrocarpon* LeConte in having bearded nodes and larger spikelets. This is described in Britton's Manual as *P. porterianum* Nash, but an earlier name is *P. boscii* Poir., the type of which is in the herbarium at Florence.

Panicum virgatum L. Sp. Pl. 59. 1753.

The type sheet bears the number 578 and Gronovius's polynomial which accompanies this Clayton number in the Flora Virginica.[e] It is the species described in our manuals as *Panicum virgatum*. Pinned to this is a sheet of the same species bearing the number 606 and Gronovius's polynomial corresponding to this number of Clayton in his Flora. Linnæus has written the name upon the first sheet only.

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[a] Sp. Pl. 58. 1753, and ed 2. 86. 1762.
[b] Hist. Jam. **1**: 115. *pl. 72. f. 3.*
[c] Sp. Pl. 59. 1753; ed. 2. 87. 1762.
[d] Op. cit. 59.
[e] **2**: 133. 1743.

Panicum hirtellum L. Syst. Nat. ed. 10. **2:** 870. 1759.

The type, from "Br," is *Oplismenus hirtellus* (L.) Roem. & Schult., and is more fully described in Amoen. Acad. **5:** 391. 1759. The axes of the spikes are hispid, as also the spikelets, but not the axis of the inflorescence. The awns are about 1 cm. long.

Panicum colonum L. Syst. Nat. ed. 10. **2:** 870. 1759.

There are two sheets in the herbarium marked by Linnæus, one being from "Br." Both are *P. colonum* as generally understood, though Munro states that one is *P. crusgalli*. I should consider the specimen from Browne to be the type, as it answers better to Linnæus's description. Linnæus cites Sloane's plate 64, figure 2, but does not use his diagnosis, hence Sloane's plant is not the type.

Panicum reptans L. Syst. Nat. ed. 10. **2:** 870. 1759.

This name should replace *P. grossarium*, as indicated below under that title.

Panicum grossarium L. Syst. Nat. ed. 10. **2:** 871. 1759.

No specimen or locality is cited here by Linnæus but the plant is more fully described, later, in his list of Jamaica plants.[a] The specimen in the herbarium is from "Br." The word "reptans" was written on the sheet and then crossed out. *Panicum reptans* L. Syst. Nat. ed. 10. **2:** 870. 1759, has been regarded as of uncertain identity. The description applies to this specimen and, as this name is omitted in all the later works of Linnæus, it is quite probable that he described the same plant twice. The description of *Panicum reptans*, placed between *P. hirtellum* and *P. sanguinale*, is as follows: "P. panicula racemis simplicibus alternis secundis, flosculis geminis muticis; pilis rarioribus involucratis." On the next page is the character of *Panicum grossarium* (between *P. miliaceum* and *P. latifolium*): "P. panicula ramis simplicibus, floribus geminis; pedicello altero brevissimo; altero longitudine floris." The specimen is not what has been considered *Panicum grossarium* by most authors but is *Panicum prostratum* Lam. Ill. Gen. **1:** 171. 1791. I propose then to take up the name *Panicum reptans* L. for the grass which has been known as *P. prostratum* Lam. Linnæus's description quoted above applies perfectly, even to the occasional long hairs on the rachis. I am assuming that Richter is correct in placing the date of publication of the tenth edition of the Systema in May, 1759, and the dissertation entitled "Pugillus Jamaicensium plantarum" in December, 1759. In the latter work *P. grossarium* is described, but *P. reptans* is not mentioned.

The plant which has been called *Panicum grossarium* and for which a different name must be taken up is *Panicum adspersum* Trin. Gram. Pan. 146. 1826.

Panicum divaricatum L. Syst. Nat. ed. 10. **2:** 871. 1759.

The specimen is from "Br." It is the small-leaved clambering form which is also found in southern Florida.

Milium punctatum L. Syst. Nat. ed. 10. **2:** 872. 1759.

The type, from "Br," is *Eriochloa punctata* (L.) Hamil. Awn about 1 mm. long; axis pubescent but not villous; no conspicuous hairs around the base of the spikelet.

Agrostis mexicana L. Mant. **1:** 31. 1767.

Cultivated, "H U." This is *Muhlenbergia mexicana* (L.) Trin.

Agrostis virginica L. Sp. Pl. 63. 1753.

The Linnæan specimen, which is the type, is *Sporobolus virginicus* (L.) Kunth. Linnæus cites after his own diagnosis, "Clayt. virg. 507." Clayton's specimen is the same species. This number is not mentioned by Gronovius in the first edition of his Flora Virginica. In the second edition (page 14. 1762) it occurs under *Uniola subspicata*, etc. This number of Clayton is cited by Linnæus under *Uniola spicata* also.

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[a] Amoen. Acad. **5:** 392. 1759.

Agrostis indica L. Sp. Pl. 63. 1753.

The type specimen from "Br," is *Sporobolus indicus* (L.) R. Br. Linnæus[a] cites as a synonym, Sloane, Hist. Jam. **1:** 115. *pl. 73. f. 1.* This also is *Sporobolus indicus.* Linnæus cites the same plate under *Poa ciliaris.*[b]

Agrostis radiata L. Syst. Nat. ed. 10. **2:** 872. 1759.

The specimen in the Linnæan herbarium from "Br" is *Chloris radiata* (L.) Sw. as described in Grisebach's Flora. *Chloris radiata* (L.) Sw. Prod. 26. 1788, is based on *Agrostis radiata* L. Swartz's specimen is also this species. After his own description in the Systema Linnæus cites Sloane's plate 68, figure 3, but does not use his diagnosis, hence the Linnæan plant is the type. Sloane's plant is *Chloris eleusinoides* Griseb.

Agrostis cruciata L. Syst. Nat. ed. 10. **2:** 872. 1759.

The specimen is from "Br." Linnæus cites Sloane's plate 69, figure 1 after his own description, but does not use his diagnosis, hence Browne's plant in the Linnæan herbarium is the type. This and Sloane's plant are *Chloris cruciata* (L.) Sw., as generally understood.

Aira spicata L. Sp. Pl. 64. 1753.

All the species of Aira of Linnæus are based upon Old World material. Linnæus inadvertently gave the specific name *spicata* to two species of Aira in the same publication. The first is on page 63. He discovered this error and in the errata, volume 2, changed the name of the first to *indica.* In the tenth edition of the Systema Naturae he described the first species under the name *A. indica* and the second he changed to *A. subspicata,* thus eliminating the name *spicata* altogether. In the Species Plantarum, ed. 2, 1762, the name *spicata* is retained for the second, probably inadvertently. The two specimens in the herbarium show evidence of these changes. The first sheet, which is *Panicum indicum,* shows the word Aira with a line drawn through, Panicum written in front, and the final "*a*" of the specific name changed to "*um.*" The second sheet, which is *Trisetum subspicatum* (L.) Beauv., shows that "*sub*" has been later prefixed to "*spicata.*" The specimen of this is pubescent like *Avena mollis* Michx. (*Trisetum molle* (Michx.) Kunth.) Some authors have restricted the Linnæan name to the glabrous form and used Michaux's name for the pubescent form, either as a species or a subspecies. If the two forms are considered distinct, the glabrous form must receive a different name.

As Linnæus corrected the name of the first *Aira spicata* to *Aira indica* in his list of errata, the latter name is valid for that species. The second *Aira spicata* is also valid and the name of the species is *Trisetum spicatum* (L.) Richter, Plant. Europ. **1**: 59. 1890 (*T. subspicatum* (L.) Beauv.; *T. molle* (Michx.) Kunth.)

Aira aquatica L. Sp. Pl. 64. 1753 (*Catabrosa aquatica* (L.) Beauv.), *A. caespitosa* L. loc. cit. (*Deschampsia caespitosa* (L.) Beauv.), and *A. flexuosa* L. op. cit. 65 (*Deschampsia flexuosa* (L.) Trin.) appear to be identical with our North American forms.

Poa flava L. Sp. Pl. 68. 1753.

Based on "Gron. virg. 13." Gronovius's specimen, Clayton no. 273, which is the type, is *Triodia cuprea* Jacq.[c] I do not consider this species congeneric with Triodia R. Br. Beauvois based his genus Tricuspis upon this species, changing[d] *Poa caerulescens* Michx. (a herbarium name for this species) to *Tricuspis caroliniana.* But on account of Tricuspis Pers. 1807, Roemer and Schultes changed the name of the genus to Tridens, citing Beauvois's figure. The type species is *Tridens quinquifida* (*Poa quinquifida* Pursh, which is the same as *Poa flava* L.). Hence the name becomes *Tridens flava* (L.) Hitchc. Rhodora **8:** 210. 1906.

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[a] Sp. Pl. 63. 1753 and ed. 2. 94. 1762.

[b] Sp. Pl. ed. 2. 102. 1762.

[c] Cf. Bot. Gaz. **38:** 297. 1904.

[d] Agrost. 77. *pl. 15. f. 10.* 1812.

Poa capillaris L. Sp. Pl. 68. 1753.

The type specimen, from "K," is *Eragrostis capillaris* (L.) Nees. The Gronovius specimen incorrectly cited by Linnæus (Clayton no. 580) is *Eragrostis pectinacea* (Michx.) Steud.

Poa ciliaris L. Syst. Nat. ed. 10. **2:** 875. 1759.

The type specimen, from "Br," is *Eragrostis ciliaris* (L.) Link. Linnæus[a] cites Sloane's plate of *Sporobolus indicus* under this.[b]

Briza eragrostis L. Sp. Pl. 70. 1753.

The type specimen, from "K." is *Eragrostis megastachya* (Koel.) Link. The Gronovius reference (Clayton no. 582) is the same. Both are the more compact-panicled form. Linnæus's specimen of *Poa eragrostis* L. Sp. Pl. 68. 1753, from Europe is the form with more open panicles, but has the same large spikelets. The European botanists (e. g. Ascherson and Graebner, Syn. Mitteleurop. Fl. **2:** 372. 1900.) consider *Poa eragrostis* L. to be the allied species (*Eragrostis minor* Host) with smaller, glandless spikelets, and quite open panicle. Though the Linnæan specimen is *Eragrostis megastachya*, yet the name *Poa eragrostis* may perhaps be considered as applicable to a traditional species rather than to the specimen in his herbarium. This is a question which European botanists will doubtless be prepared to decide. It seems to me, however, that the description applies better to his specimen ("spiculis serratis decemfloris") than to *Eragrostis minor*.

Uniola paniculata L. Sp. Pl. 71. 1753.

The type specimen is marked "Uniola 1," that is, the first Uniola described in the Species Plantarum. It belongs to this species as generally understood. Linnæus cites Gronovius, "Uniola calycibus polyphyllis." In the first edition of Gronovius this citation is based upon a reference to Hortus Cliffortianus and not upon a Clayton plant. In the second edition a Clayton plant, no. 909, is mentioned, but this number could not be found in the British Museum. There is no doubt, however, as to the identity of the plant; it is the same as that of Linnæus. Gronovius refers to a figure of Plukenet and gives the common name "sea-side oat."

Uniola spicata L. Sp. Pl. 71. 1753.

The type specimen, from "K," is *Distichlis spicata* (L.) Greene. After his diagnosis Linnæus cites Clayton no. 507, but this is *Sporobolus virginicus* (L.) Kunth. Linnæus had already cited this number of Clayton under *Agrostis virginica*.

Dactylis cynosuroides L. Sp. Pl. 71. 1753.

The Linnæan specimen, which is the type, is from Gronovius and is marked with the number 577 and accompanied by Gronovius's diagnosis. Gronovius's plant cited by Linnæus (Clayton no. 577) is the same, namely, *Spartina polystachya* (Michx.) Ell. and should be called *S. cynosuroides* (L.) Willd.[c]

Linnæus subjoins a variety β based on a Gronovian citation. The corresponding plant, Clayton no. 583, is *Spartina glabra* Muhl.

A second sheet pinned to the Linnæan plant mentioned above (no. 577) is marked by Linnæus "1," that is the first species of Spartina. There is also a label attached which says "Phalaroides spicis linearibus subternis terminalibus secundis adpressis." This citation is from Loefling.[d] The plant appears to be *Spartina stricta* of Europe, and is probably the basis of the European habitat. (Linnæus gives as habitat, "Virginia, Canada, Lusitania.") There is no evidence of his having seen a plant from Canada. Linnæus's diagnosis "spicis sparsis secundis scabris numerosis" applies to the first Gronovian plant cited rather than to either of the others.

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[a] Sp. Pl. ed. 2. 102. 1762.

[b] *Pl. 73. f. 1.*

[c] Cf. Bot. Gaz. **35:** 216. 1903.

[d] Iter. 115. 1758.

Cynosurus virgatus L. Syst. Nat. ed. 10. **2:** 876. 1759.

The type specimen, from "Br," is *Leptochloa virgata* (L.) Beauv. After his own description Linnæus cites Sloane's plate 70, figure 2, but does not use his diagnosis, hence Sloane's plant, which is also *Leptochloa virgata*, is not the type. Linnæus cites the same plate of Sloane under *Panicum sanguinale*.[a]

Bromus purgans L. Sp. Pl. 76. 1753.

One sheet is marked "3 purgans H U." The specimen has rather sparsely retrorse-pubescent, overlapping sheaths and evenly pubescent spikelets. This is *B. latiglumis* (Scribn.) Hitchc.[b] (*Bromus altissimus* Pursh, not Gilib.). A second sheet is marked "K 4." In this specimen the sheaths are not overlapping, but the spikelets are pubescent all over like the first. This is *B. purgans* as ordinarily understood and as described in Shear's Monograph of Bromus.[c] A third sheet is marked "H U 4" and is like the first sheet. It will be observed that there is considerable confusion here. Bromus no. 3, as described in the Species Plantarum, is called *purgans*, and no. 4 is called *ciliatus*. Both are said to come from Canada, collected by Kalm, the latter (*ciliatus*) being from seed. But none of the specimens is *B. ciliatus* as we understand the species[d] nor corresponds to the description given by Linnæus, which is unusually ample. In his description he states "petalorum marginibus (non dorso) valde pilosis," while in the specimens the lemmas are pubescent all over, as described for *B. purgans*. We must conclude that there is no type of *B. ciliatus* in the herbarium and that the specimens marked "4" are not types of this species. We can thus retain the name for the species as described in our manuals and in Shear's Monograph. As to *B. purgans*, Linnæus's description does not distinguish between the three specimens; that is, between *B. purgans* and *B. latiglumis*. Of these three specimens, two are marked "H U," indicating that they were cultivated in the garden at Upsala. The third specimen, marked "K 4," is the only one collected by Kalm. This plant, which is *Bromus purgans* as commonly understood and as described in Shear's Monograph of Bromus,[c] should be taken as the type, in spite of the "4" placed upon the sheet by Linnæus, probably inadvertently. In the Stockholm herbarium are two specimens marked *B. purgans*.[e] The second specimen, marked by Solander, is *B. latiglumis* (Scribn.) Hitchc. The other, marked by Linnæus "H U 4" and "e semine Canadensi," seems to be the same, though it is only a panicle.

Bromus ciliatus L. Sp. Pl. 76. 1753.

There is no type specimen of this species. The specimens marked "4," that is, *B. ciliatus*, which is the fourth species of Bromus, do not agree with Linnæus's description. The original Linnæan description applies to *Bromus ciliatus* as currently understood and as described in Shear's Monograph of Bromus.[f] For a further discussion of this species see notes above under *B. purgans*.

Stipa avenacea L. Sp. Pl. 78. 1753.

The type specimen is from Gronovius, as it bears his diagnosis, "Hordeum spica tenuiori," etc. It is also marked by Linnæus "3 capillata," but does not bear the name *avenacea*. Apparently Linnæus intended first to name the species *capillata*, but subsequently adopted the name *avenacea*. This specimen and that of the Gronovian herbarium (Clayton no. 621) are *Stipa avenacea* as generally understood.

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[a] Sp. Pl. 57. 1753; ed. 2. 85. 1762.
[b] Rhodora **8:** 211. 1906.
[c] U. S. Dept. Agr. Div. Agrost. Bull. **23:** 39. 1900.
[d] Shear's Monograph (loc. cit. 31).
[e] Cf. Lindman, Arkiv. Bot. **7:** 43. 1907.
[f] U. S. Dept. Agr. Div. Agrost. Bull. **23:** 31. 1900.

Avena pensylvanica L. Sp. Pl. 79. 1753.

The type specimen, marked "3 K pensylvanica," is *Trisetum pennsylvanicum* (L.) Beauv.

Avena spicata L. Sp. Pl. 80. 1753.

The specimen is marked "K 10 bromoides." The word *bromoides* has been scratched out with pencil. Since the plant is *Danthonia spicata* (L.) Beauv. and answers to the description of his Avena no. 10, *A. spicata*, we may assume that this is the type and that there was some error in marking the name *bromoides* on the sheet. Linnæus later describes an *Avena bromoides* from Europe, a different species.

Arundo phragmites L. Sp. Pl. 81. 1753.

This is based on European material, but there is a reference to Gronovius. In the first edition of Gronovius the number of Clayton's specimen is given as 481. In the second edition the number is 581. Clayton's specimen is numbered 581. It is *Phragmites phragmites* (L.) Karst. (*P. communis* Trin.).

Aristida americana L. Syst. Nat. ed. 10. **2:** 879. 1759.

The type specimen, from "Br," is *Bouteloua americana* (L.) Scribn. (*B. litigiosa* Lag.).

Elymus canadensis L. Sp. Pl. 83. 1753.

The type specimen is not the form described as *E. canadensis* in recent manuals, but is the allied glaucous form which has been distinguished as *E. glaucifolius* Muhl. For a discussion of this specimen see note below under *E. philadelphicus*.

Elymus philadelphicus L. Amoen. Acad. **4:** 266. 1759.

One sheet is marked by Linnæus "philadelphicus 3" and "H U." Under the latter appears to be the word "Canada." The figure 3 appears to be crossed out. This is the glaucous form called *E. glaucifolius* Muhl. It has a large, pendulous spike, with diverging awns, and blades 1.5 to 2 cm. broad. This is apparently the specimen Linnæus describes under *E. canadensis*, which is Elymus no. 3. The diagnosis reads "spica flaccida-pendula." A second sheet has a specimen of the same species, but with erect spike and ascending awns. Linnæus has not written upon this, but there is a transcription of the diagnosis of *E. canadensis* and also "Elymus canadensis, Spec. 3, p. 83," and, "ex seminibus canadensis in hortulo meo [then an illegible word] 1753" followed by "Leche" in pencil. Leche was professor at Åbo. At the Stockholm herbarium there are also two sheets, one marked "Elymus philadelphicus" by Solander and the other "3" by Linnæus and "3 canadensis" by the younger Linnæus. Both are *E. glaucifolius*, but the second is less glaucous, the spike not quite so stout, the awns more ascending. The two specimens correspond very well to the two in the Linnæan herbarium at London, except that the one marked "philadelphicus" at the former place is erect and at the latter place is nodding. It will be noted that in the description of *E. philadelphicus* it is distinguished from *E. canadensis* by having a nodding spike and more flexuous awns. While it seems clear that at the time of describing *E. philadelphicus* Linnæus wished to apply this name to the nodding form and the name *E. canadensis* to the erect form, yet we are left in doubt as to the types of the two. The figure 3 on the specimen in the Stockholm herbarium with erect spike and ascending awns, and marked "canadensis" by Linnæus fil., is said by Lindman [a] to have been written by the elder Linnæus. The latter has not marked any specimen with the name *canadensis*. I suspect that the history of the specimen is about as follows: Both forms were growing in the Hortus Upsalensis. Linnæus described *E. canadensis* from the nodding form, and marked the specimen in his herbarium "3." Later he distinguished between the two forms in his garden and

[a] Arkiv. Bot. **7:** 45. 1907.

decided to call the erect form *canadensis*. So he crossed out the "3" on his specimen and wrote "philadelphicus," but did not mark a specimen "canadensis." In this case the specimen marked "philadelphicus" is the nomenclatorial type of both. Each is described in the second edition of the Species Plantarum, but here he fails to distinguish between them. He copies the diagnosis of *E. philadelphicus*, but not the distinction he has made between that and *E. canadensis*. He also copies the description of *E. canadensis* and distinguishes that from *E. sibiricus* without mentioning *E. philadelphicus*. There is no doubt that all the specimens considered above are the same species, *E. glaucifolius* Muhl., which name must give way to *E. canadensis*. Heretofore the green form with more slender spikes has been considered typical *E. canadensis*. *E. philadelphicus* becomes a synonym of *E. canadensis*. It is interesting to note that in an article on "Demonstrationes Plantarum,"[a] in which Linnæus gives a list of plants cultivated in the Upsala garden, he says concerning *E. canadensis*, "Duplex in Horto occurrit; alter spica incurvata, alter spica pendula ut in E. sibirico, sed structura plantae vix admittit differentiam specificam."

Elymus virginicus L. Sp. Pl. 84. 1753.

The type specimen is marked "4 virginicus." Glumes and lemmas smooth, the former about 1.5 cm. long, including the awn point of about 5 mm., the latter with awns 1 to 1.5 cm. long. The Clayton specimen (no. 446), corresponding to the Gronovian synonym cited by Linnæus, is not in the British Museum.

Elymus hystrix L. Sp. Pl. 560. 1753.

The type specimen is from Gronovius. Linnæus has written upon it "6 Hystrix." The specimen in the Gronovian herbarium at the British Museum (Clayton no. 570) is the same. *Hystrix hystrix* (L.) Millsp. (*Hystrix patula* Moench.).

Hordeum jubatum L. Sp. Pl. 85. 1753.

The type specimen is marked "6 K jubatum." It belongs to this species as described in our manuals.

Coix dactyloides L. Sp. Pl. 972. 1753.

The type specimen is marked "2 dactyloides H U." Linnæus later includes this species in his new genus Tripsacum,[b] of which it is the type. The specimen is the ordinary form of *Tripsacum dactyloides* (L.) L. with three spikes.

Tripsacum hermaphroditum L. Syst. Nat. ed. 10. **2:** 1261. 1759.

Based upon Browne, Hist. Jam. 367. 1756. I did not find a specimen of this. The species is *Anthephora hermaphrodita* (L.) Kuntze (*A. elegans* Schreb.).

Olyra latifolia L. Syst. Nat. ed. 10. **2:** 1261. 1759.

This is based on "Olyra, Sloan. Jam. t. 64, f. 2." Sloane's plant, which is the type, belongs to the species as usually described. The Linnæan specimen from "Br" is the same.

Zizania aquatica L. Sp. Pl. 991. 1753.

One specimen marked by Linnæus "Zizania H U" and another marked "1 aquatica" are both the small narrow-leaved form named *Z. aquatica angustifolia* Hitchc.[c] The blades are not over 7 or 8 mm. wide. Linnæus gives two synonyms, Gronovius's Clayton no. 574 and Sloane's plate 67, both of which are the ordinary wide-leaved form.

Later Linnæus described a second species, *Z. palustris*.[d] There is no specimen in the herbarium marked thus. The description is quite ample, but the only character given which would enable us to tell which form he had in mind is that the leaves are wider than those of *Arundo phragmites*. The latter (*Phragmites phragmites* (L.) Karst.) has blades rarely as narrow as 1 cm. and usually 2 or 3 cm. wide. We may conclude, then, that he is describing the wide-leaved form, or what

[a] Amoen. Acad. **3:** 401. 1756.
[b] Syst. Nat. ed. 10. **2:** 1261. 1759.
[c] Rhodora **8:** 210. 1906.
[d] Mant. **2:** 295. 1771.

we have been calling *Zizania aquatica*. The description of *Z. aquatica* as given by Linnæus is very short, "panicula effusa," and would apply to either form. He probably did not then distinguish between the two. Both synonyms refer to the broad-leaved form and the habitat given is Jamaica and Virginia, where the narrow-leaved form is not known to occur. However, it seems evident that the only plant that Linnæus saw was the narrow-leaved form. His description was short because he thought there was but one species. The fact that later he described the broad-leaved form as a distinct species confirms the opinion that his idea of *Z. aquatica* was the narrow-leaved species. Consequently we must call the narrow-leaved species ***Zizania aquatica*** L. and the broad-leaved species *Z. palustris* L.

Pharus latifolius L. Syst. Nat. ed. 10. **2**: 1269. 1759.

The type specimen is from "Br," and is the common Jamaican species. Linnæus,[a] following his own diagnosis, cites Sloane's plate 73, figure 2, which is the same.

Andropogon divaricatum L. Sp. Pl. 1045. 1753.

The type specimen is marked "2 divaricatum" and is from Gronovius. As pointed out elsewhere,[b] this is the same as *A. alopecuroides* L., which is an Erianthus. It should be called **Erianthus divaricatus** (L.) instead of *Erianthus alopecuroides* (L.) Ell. Linnæus also cites a synonym from Gronovius which is based on Clayton no. 600. This is *Sorghastrum linnaeanum* (Hack.) Nash.

Andropogon nutans L. Sp. Pl. 1045. 1753.

The type specimen is marked "3 K nutans." It agrees with Linnæus's diagnosis and is *Sorghastrum nutans* (L.) Nash, as described in Small's Flora. The panicle is rather compact and the awn bent once. On the back of the sheet is a reference to Gronovius, "Lagurus Clayton 600," but, as indicated above, that is *S. linnaeanum* (L.) Nash. Linnæus cited two synonyms of his *Andropogon nutans*, one from Gronovius based on Clayton no. 621, which is *Stipa avenacea* L., and one from Sloane (plate 14, figure 2), which is *Valota insularis* (L.) Chase (*Andropogon insulare* L.; *Panicum leucophaeum* H. B. K.).

Andropogon alopecuroides L. Sp. Pl. 1045. 1753.

The type specimen is a Gronovian plant and bears Clayton's number 601. The corresponding specimen of Gronovius's herbarium is the same, *Erianthus alopecuroides* (L.) Ell., but should be called *E. divaricatus*, as indicated above in the discussion of *Andropogon divaricatum* L. Linnæus here[c] also cites Sloane's plate 70, figure 1, which is *Imperata caudata* Trin.

Andropogon virginicum L. Sp. Pl. 1046. 1753.

The type specimen is marked "7 virginicum," but without indication as to its origin. It belongs to this species as usually understood. Gronovius's specimen (Clayton no. 460) is the same. A second sheet in the herbarium from "Br." is *A. leucostachys* H. B. K. Linnæus[d] cites Sloane's plate 68, figure 2, which is *Andropogon leucostachys* H. B. K.

Andropogon bicorne L. Sp. Pl. 1046. 1753.

The type specimen marked by Linnæus belongs to the West Indian species known by this name. A second sheet with a Gronovius label and numbered 602 is *A. scoparius* Michx. The diagnosis of Gronovius, based on this latter specimen, is cited by Linnæus under *A. hirtum*, an Old World plant, but not under *A. bicorne*. Clayton no. 602 in the Gronovius herbarium is also *A. scoparius* Michx. The Gronovian synonym given by Linnæus under *A. bicorne* is supported by a plant in the Gronovian herbarium (Clayton no. 606) which is *Andropogon glomeratus* (Walt.) B. S. P. Linnæus[e] cites Sloane, page 42, and later *f* cites his plate 15.

[a] Also Sp. Pl. ed. 2. 1408. 1762.
[b] Bot. Gaz. **35**: 215. 1903.
[c] Also Sp. Pl. ed. 2. 1481. 1762.
[d] Sp. Pl. ed. 2. 1482. 1762.
[e] Sp. Pl. 1046. 1753.
[f] Sp. Pl. ed. 2. 1482. 1762.

Andropogon ischaemum L. Sp. Pl. 1047. 1753.

This is an Old World plant, but the only specimen in the herbarium is marked "11 Ischaemum" and is *A. furcatus* Michx. This should not be taken as the type of the species, since it is not the plant Linnæus describes.

Andropogon insulare L. Syst. Nat. ed. 10. **2:** 1304. 1759.

The type specimen is from "Br." It is *Valota insularis* (L.) Chase (*Panicum leucophaeum* H. B. K.). After his own description Linnæus cites Sloane's plate 14, figure 2, which is also this species, but he does not use Sloane's diagnosis.

Andropogon barbatum L. Syst. Nat. ed. 10. **2:** 1305. 1759.

The type specimen, from "Br," agrees with Linnæus's description. It was first marked *Andropogon fasciculatum;* the specific name was scratched and *barbatum* written above. This latter name is also scratched and *polydactylon* written after. Both changes appear to have been made by Linnæus. The plant is *Chloris polydactyla* (L.) Sw., as described in Grisebach's Flora.[a] Linnæus here cites Sloane, plate 65, figure 2, which he earlier referred to *Andropogon fasciculatum*, but which in fact is *Chloris polydactyla*. Later[b] Linnæus changes the name *barbatum* to *polydactylon*, citing Browne and also the plate of Sloane just mentioned. Upon these grounds Nash forms the name *Chloris barbata* (L.) Nash,[c] but according to the recent code of nomenclature this name can not be used on account of *Chloris barbata* (L.) Sw. Fl. Ind. Occ. **1:** 300. 1797, which is *Andropogon barbatum* L. Mant. **2:** 302. 1771, from the East Indies.

Andropogon fasciculatum L. Sp. Pl. 1047. 1753.

Munro[d] states that there are two Linnæan specimens marked with this name, one being *Eleusine indica* and the other *Pollinia ciliata*. The only plant from America bearing this name in the Linnæan herbarium is the sheet mentioned above under *Andropogon barbatum*, in which the name *fasciculatum* was scratched. But this specimen is marked "Br" and presumably was not available when Linnæus drew up his original description, though the description applies well to this specimen. This specimen is, no doubt, the basis of the Browne synonym cited in Sp. Pl. ed. 2. 1483. 1762, under *A. polydactylon*. Linnæus[e] cites Morison, Gramen Dactylon Indicum, etc., but this is an Indian plant and has villous spikes, while Linnæus remarks that the spikes in his specimen are glabrous. The habitat is given in the original publication as "Indies," that is, the West Indies. Linnæus[f] doubtfully refers here Sloane, plate 65, figure 2, which is *Chloris polydactyla* (L.) Sw., cited later under *Andropogon barbatum*[g] and *A. polydactylon*.[h] We may therefore eliminate these two synonyms of Morison and Sloane, which are the only ones given. In the Systema Naturae[i] Linnæus retains *A. fasciculatum* along with his new *A. barbatum* to which he transfers the Sloane citation. In the Pugillus Jamaicensium[j] he does not mention *A. fasciculatum*, but he gives *A. barbatum*, which is founded on the Browne specimen. In the second edition of the Species Plantarum he still retains *A. fasciculatum* with the original description and the Morison citation, introduces a new citation (Browne Jam. 365), and changes the Sloane citation to plate 69, figure 2, which is *Paspalum virgatum*. It is evident that the type of *A. fasciculatum* is not from America in spite of the continued reference to American citations.

Holcus laxus L. Sp. Pl. 1048. 1753.

The type specimen is a Gronovian plant numbered 589, upon which Linnæus has written "6 laxus." It is *Uniola laxa* (L.) B. S. P. (*Uniola gracilis* Michx.). Clayton no. 589 in the Gronovian herbarium is the same.

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[a] Fl. Brit. W. Ind. 539. 1864.
[b] Sp. Pl. ed. 2. 1483. 1762.
[c] Bull. Torr. Club **25:** 443. 1898.
[d] Proc. Linn. Soc. **6:** 53. 1862.
[e] Sp. Pl. 1047. 1753.
[f] Loc. cit.
[g] Syst. Nat. ed. 10. **2:** 1305. 1759.
[h] Sp. Pl. ed. 2. 1483. 1762.
[i] Ed. 10. **2:** 1305. 1759.
[j] Amoen. Acad. **5:** 389. 1759.

Holcus striatus L. Sp. Pl. 1048. 1753.

The type specimen is a Gronovius plant numbered 590, upon which Linnæus has written "7 striatus." It is *Sacciolepis striata* (L.) Nash (*Panicum gibbum* Ell.). Clayton no. 590 in the Gronovius herbarium is the same.

Apluda zeugites L. Syst. Nat. ed. 10. **2:** 1306. 1759.

The type specimen is from "Br." It is *Zeugites americana* Willd., which, however, must be called **Senites zeugites** (L.) Nash in litt. Senites Adans. replaces Zeugites R. Br., which is a hyponym.

Cenchrus echinatus L. Sp. Pl. 1050. 1753.

The type specimen, which belongs to this species as usually understood, is marked by Linnæus "echinatus" without indication as to its origin. Following a number of other synonyms Linnæus[a] cites Sloane, page 108. The habitat given by Linnæus is "Jamaica, Curassao."

Cenchrus tribuloides L. Sp. Pl. 1050. 1753.

The type specimen, from "K," is the large-burred species of the Atlantic coast which has been called *C. macrocephalus* (Doell) Scribn. and to which the Linnæan diagnosis "C. glumis semineis globosis muricato-spinosis hirsutis" and habitat "in Virginiae maritimis" better apply than to the inland plant that has been going under the name *tribuloides*. The inland species must be called *C. carolinianus* Walt. The Gronovian specimen (Clayton no. 206) is the same as the Linnæan. Sloane's plate 65, figure 1, is cited by Linnæus.[b] Sloane's specimen is *C. carolinianus* Walt.

THE GRASSES OF GRONOVIUS'S FLORA VIRGINICA.

The herbarium of Gronovius is incorporated in the general herbarium of the British Museum of Natural History. The specimens upon which Gronovius based his description in his Flora Virginica were collected in Virginia by John Clayton. Each sheet usually bears a diagnosis and the Clayton number, both of which are given by Gronovius, thus connecting the Clayton specimens with the species described in the Flora Virginica. The species are given below in the sequence in which they occur in the first edition of Gronovius's Flora Virginica (part 1, 1739; part 2, 1743), the diagnoses being quoted from that work. Many of these polynomials are cited by Linnæus as synonyms under his own species in the first edition of the Species Plantarum and are referred to in the discussion of the corresponding Linnæan species, in a preceding portion of this article.

Panicum paniculatum floribus muticis. Gron. Fl. Virg. **1:** 1739.

Clayton, no. 381. No specimen was found. I am unable to identify this plant. Gronovius cites also Pluk. Alm. 176. *t. 92. f. 7.* This appears to be a Panicum resembling *P. clandestinum* L., but it can not be certainly identified from the figure. This species of Gronovius is not cited by Linnæus.

Panicum panicula capillari erecta, foliis pilosis. Gron. Fl. Virg. **1:** 13. 1739.

Clayton, no. 454. The specimen is *Panicum capillare* L., of which it is the type.

Poa spiculis ovatis oblongis nitidis, panicula diffusa. Gron. Fl. Virg. **1:** 13, 1739.

Clayton, no. 273. This is cited by Linnæus under *Poa flava*, of which it is the type. The specimen is *Tridens flava* (L.) Hitchc. (*Triodea cuprea* Jacq.).

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[a] Also Sp. Pl. ed. 2. 1488. 1762.

[b] Sp. Pl. 1050. 1753 and ed. 2. 1489 1762.

Hordeum flosculis omnibus hermaphroditis, involucris flosculos crassitie & longitudine superantibus. Gron. Fl. Virg. **1:** 13. 1739.

Clayton, no. 446. This is cited by Linnæus under *Elymus virginicus*. The Clayton specimen could not be found.

Coix seminibus ovatis. Linn. Hort. Cliff. Gron. Fl. Virg. **1:** 114. 1739.

Clayton, no. 67. This is cited by Linnæus under *Coix lachryma jobi*. The specimen in the British Museum is a species of Carex labeled *C. folliculata*. Gronovius's further description, "Gramen Lacrymae Jobi affini, fructu in spicam congesto," applies to this specimen of Carex, and we may consider it an error of determination.

Coix seminibus angulatis. Linn. Hort. Cliff. Gron. Fl. Virg. **1:** 114. 1739.

Clayton, no. 445. This is not cited by Linnæus in the first edition of his Species Plantarum. In the second edition he cites Gron. 144 [error for 114] under *Tripsacum dactyloides*. Clayton's specimen is *Tripsacum dactyloides* (L.) L.

Cenchrus capitulis spinosis tomentosis. Gron. Fl. Virg. **1:** 122. 1739.

Clayton, no. 206. This is cited by Linnæus under *Cenchrus tribuloides*. The specimen is *Cenchrus tribuloides* L. (*C. macrocephalus* (Doell) Scribn.), the large-burred, maritime form and not the inland *C. carolinianus* Walt.

Andrapogon pedunculis conjugatis in medio pilosis, etc. Roy. prodr. Gron. Fl. Virg. **2:** 132. 1743.

Under this are included two plants: 1. "*Gramen ischaemum spicis plumosis aristatis, e foliorum alis exeuntibus.*" Clayton, no. 460. This is *Andropogon virginicus* L. In the Species Plantarum (page 1046. 1753) under *Andropogon virginicus* Linnæus cites Roy. lugbd. as above and Gronovius by page only, omitting the Gronovian diagnosis. 2. "*Lagurus spicis inter folia brevia ad culmi summitatem dense fasciculatim congestis,*" Clayton, no. 606,[a] which is *Andropogon glomeratus* (Walt.) B. S. P. This is not cited by Linnæus. Gronovius cites the same specimen under *Lagurus spicis oblongis*, etc., page 135.

Andrapogon spicis conjugatis, calycibus hirsutis. Roy. prodr. Gron. Fl. Virg. **2:** 133. 1743.

Clayton, no. 602. This is cited by Linnæus under *Andropogon hirtum*. The specimen is *Andropogon scoparius* Michx.

Andrapogon culmo paniculato. Gron. Fl. Virg. **2:** 133. 1743.

Clayton, no. 601. This is cited by Linnæus under *Andropogon alopecuroides*. The specimen is *Erianthus divaricatus* (L.) Hitchc. (*E. alopecuroides* (L.) Ell.).

Andrapogon foliis arundinaceis. Gron. Fl. Virg. **2:** 133. 1743.

Clayton, no. 687. This is not cited by Linnæus. The specimen is *Erianthus contortus* Ell.

Andrapogon folio superiori spathaceo, pedunculis lateralibus oppositis unifloris aristis globosis. Gron. Fl. Virg. **2:** 133. 1743.

Clayton, no. 621. This is cited by Linnæus under *Andropogon nutans*, the last word of the diagnosis being changed to *flexuosis*, as *globosis* is an obvious error. He

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[a] There are two sheets marked with this number. The first is *Andropogon glomeratus* (Walt.) B. S. P. It is referred to by Gronovius (page 132) under "*Andrapogon pedunculis,*" etc., Roy. prodr., and again (page 135) under "*Lagurus spicis oblongis*" etc., Linn. Hort. Cliff., the Clayton diagnosis being the same in the two cases. (*Laguris spicis inter folia brevia ad culmi summitatem dense fasciculatim congestis.* Clayton, 606"). The second is *Panicum virgatum* L. referred to by Gronovius (p. 133) under "*Panicum paniculatum glumis acutis,*" with the Clayton diagnosis, "*Gramen miliaceum altissimum,*" etc. In the second edition of the Flora Virginica Gronovius disposes of the two specimens in the same way, except that he omits the citation of the page under "*Andrapogon pedunculis,*" etc.

also makes the same citation under *Stipa avenacea*. In the second edition of the Flora Virginica Gronovius refers to Clayton no. 621 under two species, on page 15 under Stipa, and on page 158 under Andropogon. The Clayton specimen is *Stipa avenacea*.

Panicum paniculatum glumis acutis. Gron. Fl. Virg. **2:** 133. 1743.

Two specimens are included: 1. *Gramen miliaceum altum maritimum foliis Arundinis.* Clayton, no. 578; and, 2. *Gramen miliaceum altissimum, panicula omnium maxima sparsa*, etc., Clayton, no. 606. Both are *Panicum virgatum*. This is cited by Linnæus under *Panicum virgatum*, with the proper Clayton diagnosis, "*Panicum paniculatum, glumis acutis* Gron. Virg. 133." Clayton 606[a] is also cited by Gronovius under Andrapogon, page 132, but it is a different diagnosis and a different specimen.

Panicum paniculis simplicibus, culmo ramoso subdiviso. Gron. Fl. Virg. **2:** 133. 1743.

Clayton, no. 458. This is cited by Linnæus under *Panicum dichotomum*, of which it is the type. This sheet has two plants, *Panicum dichotomum* L. as usually understood and *P. oligosanthes* Schult. The description applies better to the former, which, therefore, has been selected as the type specimen. For further discussion see page 117.

Panicum spica simplici, aristis aggregatis flosculo subjectis. Gron. Fl. Virg. **2:** 134. 1743.

Clayton, no. 579. This is cited by Linnæus under *Panicum glaucum* γ. The specimen is *Chaetochloa glauca* (L.) Scribn.

Panicum spicis alternis oppositisve linearibus patentissimis muticis, etc. Roy. prodr. Gron. Fl. Virg. **2:** 134. 1743. "Crab-grass."

Clayton, no. 457. This is cited by Linnæus under *Panicum sanguinale*. No specimen could be found.

Panicum spicis alternis remotis declinatis compositis. Linn. Virid. Gron. Fl. Virg. **2:** 134. 1743.

Clayton, no. 591. This is not cited by Linnæus. Under *Panicum italicum* he cites "Gron. Virg. 134," but the diagnosis is different from anything given by Gronovius. In the second edition of Gronovius the Clayton number is misprinted 561. The specimen is *Echinochloa crusgalli* (L.) Beauv.

Dactylis spicis secundis alternis erectis approximatis, calycibus unifloris subulatis. Gron. Fl. Virg. **2:** 134. 1743.

He characterizes this further as "*Gramen maritimum spicatum foliis longis angustis*", etc. Clayton, no. 583. This is cited by Linnæus under *Dactylis cynosuroides* β. The specimen is *Spartina glabra* Muhl.

Gronovius here alludes to two other specimens ("Hujus Generis sunt"). 1. *Gramen maritimum spica crassa dactyloide*, etc. Clayton no. 577. This is cited by Linnæus under *Dactylis cynosuroides*. The specimen is *Spartina cynosuroides* (L.) Willd. (*Spartina polystachya* (Michx.) Ell.) 2. *Gramen avenaceum locustis argenteis speciosis lucidis muticis, uno versu laxe dispositis*. Clayton no. 553. There is no specimen of this and I do not find that it is cited by Linnæus.

Lagurus spicis oblongis pedunculatis, etc. Linn. Hort. Cliff. Gron. Fl. Virg. **2:** 135. 1743.

Clayton, no. 606.[a] This specimen is cited by Gronovius under the "Andrapogon" on his page 132 also. Linnæus cites it under *Andropogon bicorne*. The specimen is *Andropogon glomeratus* (Walt.) B. S. P.

Lagurus humilior, panicula unica laxe nutante, culmum terminante. Gron. Fl. Virg. **2:** 135. 1743.

Clayton, no. 600. This is cited by Linnæus under *Andropogon divaricatum*. The specimen is *Sorghastrum linnaeanum* (Hack.) Nash.

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a See footnote page 128.

Aira panicula oblonga, floribus muticis, hermaphrodito masculoque, calycibus triphyllis. Gron. Fl. Virg. **2:** 135. 1743.

Clayton, no. 590. This is cited by Linnæus under *Holcus striatus*, but he changes the last word of the diagnosis to *diphyllis*. The specimen is *Sacciolepis striata* (L.) Nash (*Panicum gibbum Ell.*).

Aira calycibus trivalvibus trifloris. Gron. Fl. Virg. **2:** 136. 1743.

Clayton, no. 589. This is cited by Linnæus under *Holcus laxus*. The specimen is *Uniola laxa* (L.) B. S. P. (*U. gracilis* Michx.).

Poa panicula laxa erecta stricta, spiculis erectis oblongis. Gron. Fl. Virg. **2:** 136. 1743.

Clayton, no. 581. This is cited by Linnæus under *Poa capillaris*. The Clayton number on the sheet is 580, and is so cited in the second edition of Gronovius. The specimen is *Eragrostis pectinacea* (Michx.) Steud.

Uniola calycibus diphyllis, spiculis ovato-lanceolatis. Gron. Fl. Virg. **2:** 136. 1743.

Clayton, no. 582. This is cited by Linnæus under *Briza eragrostis*. The specimen is *Eragrostis megastachya* (Koel.) Link.

Cynosurus spicis quaternis terminatricibus horizontalibus. Roy. prodr. Gron. Fl. Virg. **2:** 136. 1743.

Clayton, no. 597. Linnæus cites the Royen diagnosis under *Cynosurus aegyptius*, but does not cite Gronovius. The specimen is *Eleusine indica* (L.) Gaertn.

Gramen avenaceum locustis aristatis, paniculis forma Echinum referentibus. Gron. Fl. Virg. **2:** 136. 1743.

Clayton, no. 570. This is cited by Linnæus under *Elymus hystrix* (Sp. Pl. 560. 1753).

The specimen is *Hystrix hystrix* (L.) Millsp. (*Asprella hystrix* Willd.; *Hystrix patula* Moench).

Arundo panicula laxa, calycibus quinquefloris. Roy. prodr. Gron. Fl. Virg. **2:** 137. 1743.

Clayton, no. 581. This is cited by Linnæus under *Arundo phragmites*. The Clayton number in the second edition of Gronovius is misprinted 481. The specimen is *Phragmites phragmites* (L.) Karst. (*P. communis* Trin.).

Arundo maxima. Ad ripas fluminis Maharin & in Carolina boreali crescit. E caudice geniculis perterebratis Angli calamos piscatorios conficiunt. Clayt. Gron. Fl. Virg. **2:** 137. 1743.

No Clayton number is given and it is not mentioned in the second edition nor is it cited by Linnæus. It probably refers to the large cane, *Arundinaria macrosperma* Michx.

Gramen arundinaceum glumarum apicibus dilute purpureis. Gron. Fl. Virg. **2:** 137. 1743.

Clayton, no. 596. The specimen of this has not been seen, and I am unable to identify it. It does not appear in the second edition of Gronovius.

Oryza glumis carina hispidis. Gron. Fl. Virg. **2:** 153. 1743.

Clayton, no. 595. This is cited by Linnæus under *Phalaris oryzoides*. The Clayton number in the second edition of Gronovius is 395. A specimen without number but bearing this diagnosis is *Homalocenchrus oryzoides* (L.) Poll.

Zizania. Gron. Fl. Virg. **2:** 189. 1743.

Clayton, no. 574. This is cited by Linnæus under *Z. aquatica*. The specimen is *Z. palustris* L.

The following additional species occur in the second edition of Gronovius's Flora Virginica, 1762:

Poa panicula diffusa angulis rectis, spiculis obtusis, culmo obliquo compresso. Linn. Fl. Suec. Gron. Fl. Virg. ed. 2. 13. 1762.

Clayton, no. 936. The specimen is *Poa annua* L.

Uniola subspicata, foliis involutis rigidis. Linn. Spec. Gron. Fl. Virg. ed. 2. 14. 1762.

Clayton, no. 507. Linnæus cites "Clayt. virg. 507" under *Agrostis virginica*[a] and also under *Uniola spicata*.[b] The specimen is *Sporobolus virginicus* (L.) Kunth. In neither case is a Gronovius or Clayton diagnosis quoted.

Uniola paniculata Linn. Spec. Gron. Fl. Virg. ed 2. 14. 1762.

Clayton, no. 909. Linnæus cites under *Uniola paniculata* "Uniola calycibus polyphyllis. Gron. virg. 136." Gronovius mentions this polynomial in connection with his preceding species, *U. calycibus diphyllis* (*Eragrostis megastachya*). Gronovius's species is without doubt the same as the Linnæan, that is, *Uniola paniculata*, although no specimen was found.

THE GRASSES OF SLOANE'S HISTORY OF JAMAICA.

The grasses described by Sloane are preserved in the Sloane herbarium at the British Museum of Natural History. The list given below is in the same sequence as that of Chapter IV, of Sloane's History of Jamaica,[c] entitled "Of Herbs with grassie Leaves,"[d] from which the diagnoses are quoted. Sloane's plates are frequently quoted by Linnæus in the first edition of his Species Plantarum, but in only a few cases are Sloane's specimens the types of the Linnæan species. In the following list it is so stated in connection with each species, if the Sloane plate is cited by Linnæus, or if the Sloane plant is the type of a Linnæan species:

Oryza. Raii hist. 1240.

An account of rice (*Oryza sativa* L.) as cultivated in Jamaica. The specimen is an awned variety.

Milium Indicum arundinaceo caule granis flavescentibus. Herm. Cat.[e] p. 425.

An account of sorghum (*Sorghum vulgare* Pers.) as cultivated in Jamaica, "for Provision." The specimen is a form with short compact panicles. There is not enough of the stem to show if it be curved.

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[a] Sp. Pl. 63. 1753.

[b] Op. cit. 71.

[c] A voyage to the islands Madera, Barbados, Nieves, S. Christophers, and Jamaica, with the natural history of the herbs and trees, four-footed beasts, fishes, birds, insects, reptiles, &c., of the last of these islands; to which is prefix'd an introduction, wherein is an account of the inhabitants, air, water, diseases, trade, &c., of that place, with some relations concerning the neighboring continent and islands of America. By Hans Sloane, M. D. vol. 1, 1707; vol. 2, 1725.

[d] 1: 102. 1707.

[e] Sloane's earlier work, Catalogus plantarum, quae in insula Jamaica sponte proveniunt, etc. 1696.

Panicum Indicum spica longissima. C. B. Theat. Bot. p. 523.

An account of pearl millet. Said to be cultivated occasionally. No common name is given. The specimen is *Pennisetum americanum* (L.) Schum.

Frumentum Indicum Mays dictum. C. B. Cat. p. 26.

An account of Indian corn or maize (*Zea mays* L.) as cultivated in Jamaica. There is no specimen.

Gramen caninum maritimum spicatum quartum. C. B. Cat. p. 29.

The specimen is *Sporobolus virginicus* (L.) Kunth.

Gramen spica brizae singulari, locustis majoribus, villosis, purpurascentibus. Cat. p. 30. Tab. 64. Fig. 1.

The specimen is the *Andropogon secundus* of Grisebach's Flora. The awns are all fallen off. The plate appears to have been taken from this specimen.

Gramen paniceum maximum, spica divisa, aristis armatum. Cat. p. 30.

Sloane gives the common name "Scotch grass." The specimen is *Echinochloa crus-galli* (L.) Beauv. with medium-long awns. Sloane states that this is cultivated all over Jamaica for fodder.

Gramen paniceum majus, spica simplici laevi, granis, petiolis insidentibus. Cat. p. 30. Tab. 64. Fig. 2.

This is cited by Linnæus under *Olyra latifolia*[a] and the Sloane specimen is the type.

Gramen paniceum spica simplici laevi. Raii hist. p. 1261.

The specimen is *Chaetochloa imberbis* (L.) Scribn.

Gramen paniceum minimum humi stratum, spica divisa mutica, foliis variegatis. Cat. p. 30. Tab. 64. Fig. 3.

This is cited by Linnæus under *Panicum colonum*. There are two specimens, *Echinochloa colona* (L.) Link, from which the plate is made, and *Panicum reptans* L. (*P. prostratum* Lam.).

Gramen echinatum maximum spica rubra vel alba. Cat. p. 30.

The specimen is *Cenchrus echinatus* L., under which it is cited by Linnæus.

Gramen maritimum echinatum procumbens culmo longiori & spicis strigosioribus. Cat. p. 30. Tab. 65. Fig. 1.

This is cited by Linnæus under *Cenchrus tribuloides*. The specimen is *C. carolinianus* Walt.

Arundo saccharifera. C. B. Cat. p. 30. Tab. 66.

The specimen is sugar cane (*Saccharum officinarum* L.) and is cited by Linnæus under *Saccharum officinarum*.

Arundo maxima folio dentato. Cat. p. 32.

There is no specimen. Sloane is evidently describing a bamboo.

Arundo alto gracilis, foliis e viridi caeruleis, locustis minoribus. Cat. p. 33. Tab. 67.

Sloane designates this as "the trumpet reed." The specimen is *Phragmites phragmites* (L.) Karst. (*P. communis* Trin.).

Gramen dactylon bicorne tomentosum minus. Cat. p. 33. Tab. 68. Fig. 2.

This is cited by Linnæus under *Andropogon virginicum*.[b] The specimen is *Andropogon leucostachys* H. B. K.

Gramen dactylon spicis brevibus crassis plerumque quatuor cruciformiter dispositis. Cat. p. 33.

The specimen is *Dactyloctenium aegyptium* (L.) Willd.

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[a] Syst. Nat. ed. 10. 1261. 1759.

[b] Sp. Pl. ed. 2. 1482. 1762.

Gramen dactylon elatius spicis plurimis tomentosis. Cat. p. 33. Tab. 65. Fig. 2.

This is cited by Linnæus under *Andropogon barbatum*[a] and under *A. polydactylon*[b] and, with a question, under *A. fasciculatum.*[c] The specimen is *Chloris polydactyla* of Grisebach's Flora.

Gramen dactylon procumbens, crassum & viridius, culmo reclinato. Cat. p. 33.

Sloane gives the common name "Dutch grass." The specimen is *Eleusine indica* (L.) Gaertn.

Gramen dactylon spicis gracilioribus plerumque quatuor cruciformiter dispositis. Cat. p. 33. Tab. 68. Fig. 3.

This is cited by Linnæus under *Agrostis radiata.* The specimen is *Chloris eleusinoides* Griseb.

Gramen dactylon bicorne repens, foliis latis brevibus. Cat. p. 33.

There are two specimens, *Paspalum conjugatum* and *Paspalum vaginatum* Sw., as described in Small's Flora. The description applies to the latter. There is no plate.

Gramen dactylon bicorne spicis purpurascentibus majus. Cat. p. 34. Tab. 65. Fig. 3.

The specimen is *Eleusine indica* (L.) Gaertn. The same species is described under *Gramen dactylon procumbens*, etc. The plate appears to be the same. There seems to be some confusion here, as the description does not apply in all respects. The spikes are said to be always two, suggesting *Axonopus compressus* (Sw.) Beauv. (*Paspalum compressum* of Grisebach's Flora.).

Gramen dactylon bicorne spicis purpurascentibus minus. Cat. p. 34. Tab. 68. Fig. 1.

The species is *Paspalum conjugatum* Berg.

Gramen dactylon bicorne minimum aristis longis armatum. Cat. p. 34. Tab. 69. Fig. 1.

This is cited by Linnæus under *Agrostis cruciata.*[d] The specimen is *Chloris cruciata* (L.) Sw.

Gramen dactylon majus, pannicula longa, spicis plurimis nudis crassis. Cat. p. 34. Tab. 69. Fig. 2.

This is cited by Linnæus under *Panicum dissectum*[e] and under *Paspalum virgatum.*[f] The specimen is *Paspalum virgatum* L. as commonly understood.

Gramen dactylon, alopecuroides facie, pannicula longissima e spicis plurimis tomentosis constante. Cat. p. 3. Tab. 70. Fig. 1.

This is cited by Linnæus under *Andropogon alopecuroides.* The specimen is *Imperata caudata* Trin.

Gramen dactylon pannicula longa, e spicis plurimis gracilioribus purpureis vel viridibus mollibus constante. Cat. p. 34. Tab. 70. Fig. 2.

This is cited by Linnæus under *Panicum sanguinale*[g] and under *Cynosurus virgatus.*[h] There are two specimens, *Leptochloa virgata* and *L. mucronata.* The description and plate refer to the former.

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[a] Syst. Nat. ed. 10. **2**: 1305. 1759.
[b] Sp. Pl. ed. 2. 1483. 1762.
[c] Sp. Pl. 1047. 1753.
[d] Syst. Nat. ed. 10. **2**: 872. 1759.
[e] Sp. Pl. 57. 1753.
[f] Syst. Nat. ed. 10. **2**: 855. 1759.
[g] Sp. Pl. 57. 1753; ed. 2. 85. 1762.
[h] Syst. Nat. ed. 10. **2**: 876. 1759.

Gramen dactylon pannicula longa, spicis plurimis gracilioribus & longis. Cat. p. 34. Tab. 70. Fig. 3.

The specimen is *Syntherisma setosa* (Desv.) Nash. For a discussion of the name to be used for this species see the account of *Milium digitatum* of the Swartz herbarium, page 142.

Gramini tremulo affine, panniculatum elegans majus, spicis minoribus & longioribus. Cat. p. 34. Tab. 71. Fig. 1.

This is cited by Linnæus under *Phalaris oryzoides.*[a] The specimen is *Eragrostis prolifera* (Sw.) Steud., as described in Grisebach's Flora. The plate was made from the specimen. The spikelets are mostly 8 to 10-flowered, the lemmas about 1.6 mm. long, and the paleas minutely ciliate-keeled.

Gramini tremulo affine, paniculatum elegans minimum. Cat. p. 34. Tab. 71. Fig. 2.

This is cited by Swartz under *Poa glutinosa.*[b] The specimen is the same as Curtiss, no. 420, from the Isle of Pines, distributed as *Eragrostis bahiensis* Steud.

Gramen miliaceum, sylvaticum, maximum, semine albo. Cat. p. 34. Tab. 71. Fig. 3.

This is cited by Linnæus under *Panicum latifolium*[c] and by Swartz under *P. glutinosum.*[d] The specimen is *Panicum sloanei* of Grisebach, who cites Sloane's plate.

Gramen miliaceum majus, panicula minus sparsa, locustis minimis. Cat. p. 34. Tab. 72. Fig. 1.

The specimen is *Sacciolepis striata* (L.) Nash (*Panicum gibbum* Ell.).

Gramen miliaceum, panicula viridi, vel purpurea. Cat. p. 34. Tab. 72. Fig. 2.

This is cited by Linnæus under *Paspalum paniculatum.*[e] The specimen is *Panicum fasciculatum* Sw.

Gramen miliaceum viridi foliis latis brevibus, panicula capillacea, semine albo. Cat. p. 35. Tab. 72. Fig. 3.

This is cited by Linnæus under *Panicum capillare.*[f] The specimen is *Panicum trichoides* Sw.

Gramen pratense panicula & foliis angustissimis, spicis brevibus muticis locustis minimis. Cat. p. 35. Tab. 73. Fig. 1.

This is cited by Linnæus under *Agrostis indica.*[g] The specimen is *Sporobolus indicus* (L.) R. Br.

Gramen avenaceum sylvaticum, foliis latissimis, locustis longis non aristatis, glumis spadiceis. Cat. p. 35. Tab. 73. Fig. 2.

The specimen is *Pharus latifolius* L., and Sloane's plate is cited by Linnæus under this species.[h]

Gramen cyperoides polystachion, spicis ad nodos ex utriculis seu foliorum alis echinatis prodeuntibus. Cat. p. 36.

This is cited by Linnæus under *Panicum clandestinum.*[i] The specimen is *Hackelochloa granularis* (L.) Kuntze (*Manisuris granularis* Sw.).

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[a] Sp. Pl. ed. 2. 81. 1762.
[b] Prod. 26. 1788.
[c] Sp. Pl. 59. 1753; ed. 2. 87. 1762.
[d] Prod. 24. 1788.
[e] Syst. Nat. ed. 10. **2**: 855. 1759; Sp. Pl. ed. 2. 81. 1762.
[f] Sp. Pl. 58. 1753; ed. 2. 86. 1762.
[g] Sp. Pl. 63. 1753; ed. 2. 94. 1762.
[h] Syst. Nat. ed. 10. **2**: 1269. 1759.
[i] Sp. Pl. 58. 1753; ed. 2. 86. 1562.

In addition to the grasses included in the above chapter, Sloane described four others. Two are from Madeira (Tab. 2. Figs. 4, 5, 6). The other two are described in an account of the plants of the island of Nieves [Nevis].

Gramen dactylon bicorne tomentosum maximum, spicis numerosissimis. Cat. pl. Jam. p. 33. Table 14 [the plate is numbered 15].

This is *Andropogon bicorne* L. The diagnosis is cited by Linnæus under that species.[a] In the second edition[b] the plate is also cited.

Gramen avenaceum, panicula minus sparsa, glumis alba sericea lanugine obductis. Cat. pl. Jam. p. 35. Tab. 14. Fig. 2.

This is cited by Linnæus under *Andropogon insulare.*[c] It is *Valota insularis* (L.) Chase (*Panicum leucophaeum* H. B. K.).

THE WEST INDIAN GRASSES DESCRIBED BY SWARTZ.

Olof Swartz collected in the West Indies, especially Jamaica, from 1783 to 1787. His collections are preserved in the Natural History Museum at Stockholm.[d] His first account of his West India plants was published in 1788 in a small work entitled "Nova Genera et Species Plantarum, seu Prodromus Descriptionum Vegetabilium Maximam Partem Incognitorum quae sub Itinere in Indiam Occidentalem annis 1783–87 Digessit Olof Swartz." This work contains the diagnoses of most of his new species of grasses. A few more appear later in his more comprehensive work entitled "Flora Indiae Occidentalis."[e] In the later work the descriptions are considerably amplified and often aid in identifying his earlier diagnoses. A few of his types of grasses are missing from his herbarium, but in all cases I have been able to identify the corresponding species from his descriptions or from authentic specimens distributed by Swartz to other herbaria, such as those of Munich and Madrid. In this article the species accredited to Swartz and published by Wikström in Adnotationes Botanicae (1829) have not been considered except when these are based on American material.

Olyra pauciflora Sw. Prod. 21. 1788.

The type specimen, labeled "Jamaica Fl. ind. occ.," belongs to this species as generally understood.

Olyra paniculata Sw. Prod. 21. 1788.

The type specimen is *Olyra latifolia* L. Swartz gives Linnæus's name as synonym.

Sacharum polystachyon Sw. Prod. 21. 1788.

No specimen of this could be found, but it is without doubt the species as generally understood; that is, *Paspalum saccharoides* Nees, as described in Martius's Flora Bra-

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[a] Sp. Pl. 1046. 1753.

[b] Sp. Pl. ed. 2. 1482. 1762.

[c] Sp. Pl. ed. 2. 1481. 1762.

[d] A few of the Swartz types, chiefly species of Paspalum, had been loaned to Prof. Carl Mez, who kindly allowed me to examine them at his herbarium in Halle.

[e] Vol. 1, 1797; vol. 2, 1800; vol. 3, 1806.

siliensis.[a] Swartz's specific name can not be taken up on account of *Paspalum polystachyum* R. Br.[b]

Leersia monandra Sw. Prod. 21. 1788.

No specimens of Leersia could be found that were types or in any way authentic. This species and the following are probably correctly understood. This species is now called *Homalocenchrus monandrus* (Sw.) Kuntze.

Leersia hexandra Sw. Prod. 21. 1788.

This is now *Homalocenchrus hexandrus* (Sw.) Kuntze.

Leersia oryzoides Sw. Prod. 21. 1788.

This is based on *Phalaris oryzoides* L., now called *Homalocenchrus oryzoides* (L.) Poll.

Paspalum conjugatum Berg.

This is included by Swartz in his Prodromus (page 21). No specimen of it was found in the Stockholm herbarium, but there is at Madrid a specimen sent by Swartz which belongs to this species as usually understood.

Paspalum vaginatum Sw. Prod. 21. 1788.

There are two Swartz specimens, on one of which is the name in the handwriting of Swartz, but both are said to have come from Mauritius. They show the characters that distinguish this species, as described in Small's Flora, from *P. distichum* L. The spikes are widely spreading or deflexed, the sheaths inflated, the spikelets smooth, the midnerve of the glume on the convex side suppressed. On one specimen the spikelets are 2.5 mm. long, on the other they are 4 mm. long. No specimen from Jamaica was found that appeared to be authentic. In the Copenhagen herbarium is a specimen sent by Swartz to Vahl which is without locality but is labeled *Paspalum vaginatum*. This has pubescent spikelets and corresponds to *P. distichum*.

Paspalum filiforme Sw. Prod. 22. 1788.

No specimen of this could be found in the Swartz herbarium. At Munich there are two sheets sent by Swartz labeled *P. filiforme*. One is *Paspalum* (*Paspalus*) *caespitosum* Flügge and the other is *Syntherisma setosa* (Desv.) Nash.[c] Neither of these corresponds to the description of Swartz, which, as amplified in his Flora,[d] is sufficient to identify the species. It is the species described under this name in Grisebach's Flora. Flügge changed the name to *Paspalus swartzianus* because of his own *Paspalus filiformis* (L.) Flügge based on *Panicum filiforme* L.,[e] but Swartz's name is valid.

Paspalum decumbens Sw. Prod. 22. 1788.

There is a specimen in the Stockholm herbarium and also specimens in the herbaria of Berlin and Delessert sent by Swartz. All are the species as generally understood. This has been called *Paspalum pedunculatum* Poir.,[f] which name must be used on account of *Paspalum decumbens* Rottb. 1778. *Panicum decumbens* Roem. & Schult.[g] is based upon Swartz's species. Fournier has referred this to his genus Dimorphostachys,[h] but the presence of an outer glume is too variable a character to be used as the basis for separating this group as a genus.

[a] **2**[2]: 92. 1877.
[b] Prod. Fl. Nov. Hol. 188. 1810.
[c] See *Milium digitatum* Sw., p. 142 below.
[d] Fl. Ind. Occ. **1**: 136. 1797.
[e] Flügge, Mon. Pasp. 96. 1810.
[f] Encycl. Suppl. **4**: 315. 1816.
[g] Syst. **2**: 429. 1817.
[h] *D. pedunculata* (Poir.) Fourn. Mex. Pl. **2**: 15. 1886.

Paspalum dissectum Sw. Fl. Ind. Occ. **1:** 137. 1797.

Flügge [a] changes the name of this to *Paspalus caespitosus* on account of *P. dissectum* L. (1759), which is a different species. The Swartz specimen is from Jamaica and is marked *P. dissectum* Sw. and also *P. caespitosum* Flügge. It is *P. caespitosum* as described in Grisebach's Flora.

Panicum setosum Sw. Prod. 22. 1788.

The specimen in the Stockholm herbarium is *Chaetochloa setosa* (Sw.) Scribn. as described by Scribner and Merrill.[b] It is also described by Grisebach[c] under *Setaria setosa* Beauv.

Panicum pilosum Sw. Prod. 22. 1788.

The type specimen is labeled "Jamaica, Swartz. fl. ind. occ." It belongs to the species described under this name in Martius's Flora Brasiliensis. It differs from *P. laxum* in the densely flowered, comparatively short panicle branches (2 to 3 cm. long) and in the pilose rachis. *Panicum distichum* Lam.[d] is the same, as indicated by the type specimen at Paris labeled by Lamarck "*Panicum distichum* lam. dict." Another synonym is *Panicum pilisparsum* G. F. W. Mey.[e] In the Trinius herbarium there is a specimen of this sent by Meyer, apparently a fragment from the type at Göttingen.

Panicum molle Sw. Prod. 22. 1788.

The type specimen is labeled in the handwriting of Swartz "P. molle fl. ind. occ." This specimen is not the species which has been generally described under this name, but *P. velutinosum* Nees,[f] a South American species allied to *P. fasciculatum* Sw., and not known to occur in the West Indies. The panicle is like that of *Panicum reticulatum* Torr., while the spikelets are very much like those of *Panicum arizonicum* Scribn. & Merr. The spikelets are 3 mm. long, brown, sparsely reticulate-nerved, and finely velvety-pubescent. The description in the Prodromus under *P. molle* is brief and applies to this specimen, except that the branches of the panicle are said to be spreading, while in the specimen they are erect-appressed. Swartz cites as a synonym "Panicum 2. Brown. Jam. 133," which is the plant commonly understood as *Panicum molle*, that is, *Panicum barbinode* Trin. The locality is given by Swartz as "India occidentalis." Swartz gives a more extended description in his Flora, where the habitat is given as "in pascuis fertilioribus subhumidis Jamaicae." We must decide whether Swartz is describing the specimen he has preserved or whether he is describing the forage plant of Jamaica, that is, the Browne plant. The description of the culm applies to either except "inferne subdivisus" and "crassus," which are not true of the Swartz specimen but are true of *P. barbinode*, and "pubescens," which does not apply to *P. barbinode*. The blades are said to be "villosa, mollia," which applies only to the Swartz specimen. The spikes are described as "fuscis," which applies to the Swartz specimen and not to *P. barbinode*, on which the inflorescence is green or purple tinged. Referring to glumes, "valvula exterior minuta" applies best to *P. barbinode*, as, in the specimen, the first glume is half as long as the spikelet, and in *P. barbinode* only about one-fourth as long. Second glume "pubescens" applies to the Swartz specimen; in *P. barbinode* the spikelets are glabrous. The interior valve (palea) of the neutral flower is said to be minute, but in both species it is well developed. The transversely rugose fertile lemma common to both species is not mentioned. In a note Swartz states that the species is distinguished by its soft pubescence and the thick, somewhat succulent culm, for which latter feature it is much liked by cattle for fodder. He

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[a] Mon. Pasp. 209. 1810.

[b] N. A. Species Chaetochloa, U. S. Dept. Agr. Div. Agrost. Bull. **21:** 39. 1900.

[c] Fl. Brit. W. Ind. 555. 1864.

[d] Encycl. **4:** 731. 1797.

[e] Prim. Fl. Esseq. 57. 1818.

[f] Agrost. Bras. 121. 1829.

further states that it is called in Jamaica Dutchgrass and is indigenous in Surinam. Swartz probably thought his specimen to be the same as Browne's plant, and, while he described his own specimen, his description was modified by his knowledge of the habit of the other species. Under these circumstances I think we should consider the specimen in Swartz's herbarium as the type of *Panicum molle*, which name should be taken up for *Panicum velutinosum* Nees. A specimen in the Munich herbarium labeled *P. molle* from Jamaica, sent by Swartz, is *Panicum sloanei* Griseb. or some closely allied species. I am not yet prepared to say whether or not *Panicum numidianum* Lam. (1791) of Africa is the same as *Panicum barbinode* Trin. (1835) of Brazil. They are made synonymous in Martius's Flora Brasiliensis. In the type of *P. numidianum* the spikes are rather loosely flowered, the rachis lacks bristles, and the lower glume is half as long as the spikelet. According to Hooker,[a] this should be *Panicum muticum* Forsk.

Panicum fasciculatum Sw. Prod. 22. 1788.

There are two forms upon the sheet, which is labeled "Jamaica, Swartz. *P. fasciculatum*. fl. ind. occ." The chief specimen (which I accept as the type) is a good match for Maxon no. 1659, collected in Jamaica in 1903. The spike-like racemes are slender and 6 to 8 cm. long, the axis and pedicels pilose with scattered long, white hairs. The spikelets are 2 mm. long, strongly reticulated, glabrous, rather dark brown in color. The right-hand specimen, also *P. fasciculatum*, has a more compact panicle, with shorter spikes and spikelets about 2.5 mm. long.

Panicum chartaginense Sw. Prod. 22. 1788.

The specimen is marked "Panicum chartaginense Fl. Ind. Occ. Swartz." It is the same as to floral character as the right-hand specimen of *P. fasciculatum* mentioned above, and has compact panicles with spikes about 2 cm. long. The habit of the plant is somewhat different. The culms are more or less prostrate-spreading, the leaves short and crowded and more or less pubescent, especially the sheaths; the panicles are somewhat included at the base; the spikelets are 2.5 mm. long. The general appearance is that of *Panicum reticulatum* Torr. of Mexico. This form can be recognized as a subspecies under the name of *Panicum fasciculatum chartaginense* (Sw.) Doell.[b] (*Panicum chartaginense* Sw.; *P. reticulatum* Torr.)

Panicum nemorosum Sw. Prod. 22. 1788.

The type specimen is marked by Swartz with the name and "fl. ind. occ." It is *Ichnanthus nemorosus* (Sw.) Doell.

Panicum acuminatum Sw. Prod. 23. 1788.

The type sheet is marked by Swartz "*P. acuminatum* fl. ind. occ. Jamaica. Swartz." The plants are all the autumnal state. This has recently been described as *Panicum comophyllum* Nash, Bull. Torr. Club **30:** 380. 1903.

Panicum rigens Sw. Prod. 23. 1788.

The type specimen is marked "*P. rigens* fl. ind. occ. Jamaica. Swartz." It is an Isachne, and is the same as that described by Grisebach in his Flora of the British West Indies under the name of *I. rigens* Trin. Grisebach's plant collected by Macfadyen in Jamaica, preserved in the herbarium of Grisebach at Göttingen, is the same. *Isachne rigens* Trin. is based upon *Panicum rigens* Sw. and the name of our plant is *Isachne rigens* (Sw.) Trin. Gram. Pan. 252. 1826, although the plant described here and in Martius's Flora Brasiliensis appears to be *Isachne rigidifolia* (Poir.) Urb. (*Agrostis rigidifolia* Poir. The type specimen of *Agrostis rigidifolia* Poir. was examined in the herbarium at Florence. It has distichous, glabrous leaves, and rigid, spreading, panicle branches quite different from those of *Panicum rigens* Sw. Sieber no. 265 from Martinique is *I. rigidifolia* and is cited by Grisebach, indicating that he confused the two species. Some of the plants sent by Swartz to other herbaria under the name of

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[a] Fl. Brit. Ind. **7:** 34. 1896. [b] In Mart. Fl. Bras. **2**[2]: 205. 1877.

Panicum rigens are not the same as the plant in his own herbarium. The specimen at Florence is *I. rigidifolia*. The specimen from the general herbarium at Stockholm, which was seen by me at Halle, is *Panicum acuminatum* Sw. The specimen at Berlin I think is the same as the original at Stockholm, though it has longer leaves, the blades being 6 cm. or more long; but, as in the case of the other, the surface of the blades is scabrous to the touch as described by Swartz. There are some points in Swartz's description which lead one to think that he had seen *Isachne rigidifolia*. He says, in the more extended description in his Flora,[a] "Gramen rigiditate peculiare." But in the original diagnosis in the Prodromus he states that the leaves are scabrous, which applies to his specimen, but not to *Isachne rigidifolia*. Swartz's type at Stockholm is well matched by Fendler no. 1637 from Venezuela (U. S. National Herbarium no. 822538).

Panicum fuscum Sw. Prod. 23. 1788.

The type specimen is marked "*P. fuscum* Flor. ind. occ. Jamaica, Swartz." The panicles are small and compact like those of *P. chartaginense* Sw., and the spikelets are like those of *P. fasciculatum* Sw., but slightly larger. A good match for this is Maxon no. 2361 from Jamaica. It should be considered a synonym of *P. fasciculatum*.

Panicum laxum Sw. Prod. 23. 1788.

The type specimen is marked "*P. laxum* fl. ind. occ. Jamaica. Swartz." It belongs to this species as usually described. Synonyms are: *P. agrostidiforme* Lam. 1791, type at Paris marked "lam. ill. gen. ex D. Richard;" *P. tenuiculmum* Meyer, 1818, portion of type in the herbarium of Trinius at St. Petersburg marked "Prim. Fl. Esseq.," sent by Meyer; *P. diandrum* Kunth, 1829, type in the Berlin herbarium, collected in Guadaloupe by Balbis (the second specimen cited by Kunth, Rio Janeiro, collected by Gaudichaud, is also in the Berlin herbarium); *P. ramuliflorum* Hochst. in Steudel, Syn. Pl. Glum. 1854, type in the herbarium of Steudel at Paris. This last specimen is also marked *Agrostis nigrescens* Salzm. and is from Bahia. Steudel's cited specimen, Kappler Pl. Surin. no. 1523 is the same species (fide specimens seen in various herbaria, such as those of Munich and Leipzig).

Panicum flavescens Sw. Prod. 23. 1788.

The type specimen is marked "*P. flavescens* fl. ind. occ. Jamaica. Swartz." It is the same as *P. fasciculatum*. The panicle is somewhat more open, but the branches of the panicle are slender, about 8 cm. long, resembling in this respect the specimen of *P. fasciculatum* rather than that of *P. fuscum*, but nearly devoid of bristles. The spikelets are brownish, strongly reticulated, slightly exceeding 2 mm. in length. *Panicum flavescens* as described by Grisebach[b] and by Hooker[c] is very different, being a species of the section Ptychophyllum.

Panicum diffusum Sw. Prod. 23. 1788.

The type specimen is labeled "diffusum fl. ind. occ.," and belongs to that species as generally understood.

Panicum oryzoides Sw. Prod. 23. 1788.

The type specimen labeled "*P. oryzoides* fl. ind. occ. Jamaica. Swartz." is the same as *P. zizanioides* H. B. K. (1815), which name must be used on account of *Panicum oryzoides* Ard. Animad. Spec. Alt. 16. 1764.

Panicum pallens Sw. Prod. 23. 1788.

The type specimen marked "*P. pallens* fl. ind. occ." is *Ichnanthus pallens* (Sw.) Munro.

[a] Fl. Ind. Occ. **1**: 154. 1797.
[b] Fl. Brit. W. Ind. 547. 1864.
[c] Fl. Brit. Ind. **7**: 56. 1896.

Panicum lanatum Sw. Prod. 24. 1788.

The type specimen marked "*P. lanatum* fl. ind. occ. Jamaica. Swartz," is allied to *P. divaricatum* L. and *P. sloanei* Griseb. The species is characterized by the densely lanose-velvety sheaths and blades. On account of the earlier *Panicum lanatum* Rottb. Descr. Pl. 3. 1776 (*Valota insularis* (L.) Chase), I suggest for Swartz's species the name **Panicum swartzianum** (*Panicum lanatum* Sw., not Rottb.).

Panicum arundinaceum Sw. Prod. 24. 1788.

There are two plants upon the type sheet, which is marked "*Panicum arundinaceum* fl. ind. occ. Jamaica. Swartz," one with a large spreading panicle, the other with a narrow compact panicle. The description applies better to the first, although they are both *Isachne arundinacea* (Sw.) Griseb.

Panicum polygamum Sw. Prod. 24. 1788.

The type specimen marked "Prodr." is *Panicum maximum* Jacq., an earlier name, which Swartz himself uses in his Flora.[a]

Panicum glutinosum Sw. Prod. 24. 1788.

The type specimen marked "*P. glutinosum* fl. ind. occ." from "Jamaica. Swartz," belongs to this species as generally understood.

Panicum trichoides Sw. Prod. 24. 1788.

There are two plants upon the type sheet, which is labeled "*trichoides* fl. ind. occ." from "Jamaica. Swartz." The left-hand specimen is the form described as *P. brevifolium* in Grisebach's Flora; the other is the same as the type of *Panicum tricanthum* Nees in the Berlin Herbarium, examined at Halle. The leaf blades of the right-hand specimen are longer and the spikelets somewhat larger than in the left-hand one. Sloane's plate[b] of *Panicum brevifolium* is cited by Swartz. It is evident from the more complete description given later in his Flora that Swartz considered his species the same as *P. brevifolium* L. and variable enough to include both the plants preserved, but wished to change the name. The type of *P. brevifolium* L. is from India. The species is shown by description and the specimen in the Linnæan herbarium to be *P. ovalifolium* as described in Hooker's Flora of British India. Hence we may consider *P. trichoides* Sw. as applying to the Tropical American species usually described as *P. brevifolium* L. (*P. capillaceum* Lam. Tabl. Encycl. **1**: 173. 1791), the left-hand plant being taken as the type, and adopt *Panicum trichanthum* Nees for the larger form.

Panicum caespitosum Sw. Fl. Ind. Occ. **1:** 140. 1797.

The type specimen marked "*P. caespitosum* fl. ind. occ." from "Jamaica. Swartz" is *Panicum prostratum* Lam., but, as shown previously (page 119), we should use the name *Panicum reptans* L. for this species. The Mexican plant which has been distributed under the name *P. caespitosum* in recent collections is a different species.[c]

[a] Fl. Ind. Occ. **1:** 170. 1797.

[b] Hist. Jam. *pl. 72. f. 3.*

[c] This was brought to my attention by Professor Mez, of Halle, for whom I propose to name this species:

BRACHIARIA MEZIANA sp. nov.

Perennial; culms cespitose, glabrous, at first erect, 20 to 30 cm. high; later branched and decumbent becoming as much as 70 cm. long; leaves light green, sheaths densely ciliate on the margin, sometimes sparsely pilose on the surface, blades 5 to 12 cm. long, 5 to 10 mm. wide, moderately stiff and firm, glabrous or sparsely pilose on either surface, ciliate on the margin near the base with papillose hairs; early panicles long-exserted, later ones less so or scarcely exserted, consisting of several spike-like racemes 2 to 3 cm. long, along the upper 2 to 3 cm. of the culm; spikelets placed with the first glume toward the axis, arranged in 2 rows on one side of a somewhat flattened narrow rachis interspersed with pilose hairs, nearly sessile, glabrous, 3 mm. long, ovate, subacute; first glume ovate, 3-nerved, 1 mm. long, second glume as long as

Panicum hirsutum Sw. Fl. Ind. Occ. **1:** 173. 1797.

The type specimen from "Jamaica, Swartz" is, as described by Swartz, a robust plant with appressed-hirsute sheaths and a large, somewhat compact panicle about 20 cm. long, with glabrous acute spikelets about 2 mm. long. Pringle no. 5573 from Mexico is the same.

Panicum kalmii Sw. Adnot. Bot. 6. 1829.

The type specimen, from Kalm marked *P. kalmii* and also *P. heterophyllum*, is *Panicum sphaerocarpon* Ell.[a]

Panicum compactum Sw. Adnot. Bot. 14. 1829.

The type specimen is from Jamaica, and belongs to this species as described by Grisebach.[b] Grisebach describes this as a new species "Sw. Herb.," overlooking the description by Wikström in the Adnotationes cited above. There is an earlier *P. compactum* Kit.,[c] but this is mentioned as a synonym under *Panicum germanicum* and hence, not being actually published, is not a valid name. I do not find that Kitaibel's name was taken up before the publication of *P. compactum* Swartz.

Milium compressum Sw. Prod. 24. 1788.

No specimen of this could be found, but the excellent description of Swartz in his Flora[d] leaves no room for doubt. It is the common pasture grass of the West Indies called *Paspalum compressum* Rasp. and *Anastrophus compressus* Schlecht. The characters of the species and its allies seem sufficiently distinct from Paspalum to warrant the segregation of the group as a genus. Schlechtendahl suggested for it the name Anastrophus. Axonopus Beauv. has been rejected by some authors on account of the dubious characters assigned to it; and has been accepted by others for diverse groups, usually centered around *Panicum cimicinum* Retz. Beauvois[e] assigns four species to this new genus, none of which he figures: *Milium compressum*, *M. digitatum*, *M. cimicinum*, *M. paniceum*. In a note he mentions another species, *Axonopus aureus*, which he characterizes very briefly, and which he says seems to him as if it ought to belong to that genus. He complicates matters somewhat by placing the mark of doubt in the index after all the species of this genus except *A. aureus*. The type of the genus must be

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spikelet, convex, prominently 5-nerved, sterile lemma as long as spikelet, flat on back, prominently 5-nerved, the first pair of nerves forming the angle of the incurved edges, the second pair of nerves near the margin, sterile floret with three stamens and a well-developed palea as long as the lemma, fertile lemma and palea minutely roughened but not rugose, the former bearing a prominent apiculation about 0.5 mm. long.

Low moist places on the plains of Mexico.

Specimens examined:

Pringle 9592, Federal District, Cerro de Guadaloupe, altitude 2,770 meters, August 19, 1901; *Palmer* 533, 254; *Conzatti & Gonzales* 348; *Bourgeau* 222, 439; *Nelson* in 1893; *Pringle* 375.

Besides these specimens which are in the National Herbarium I have examined the following cited by Fournier under *P. caespitosum* (Mex. Pl. **2:** 18. 1886): *Bourgeau* 679, *Berlandier* 575, 795, *Liebmann* 382, *Schaffner* 190, 317, *Virlet* 1309.

The type specimen is no. 156925 of the U. S. National Herbarium (Pringle's 9592).

The genus Brachiaria was established by Grisebach (in Ledeb. Fl. Ross. **4:** 469. 1853) with a single species, *B. eruciformis* (Sibth.) Griseb., which is the type. Brachiaria differs from Panicum chiefly in having spikelets so placed that the fertile floret stands with its palea toward the axis, i. e., with the first glume toward the axis. The spikelets are subsessile in one-sided racemes, these racemose on an elongated axis.

[a] Bot. S. C. & Ga. **1:** 125. 1816.

[b] Fl. Brit. W. Ind. 552. 1864.

[c] In Schultes, Oester. Fl. ed. 2. **1:** 212. 1814.

[d] Fl. Ind. Occ. **1:** 183. 1797.

[e] Agrost. 12. 1812.

either *Milium compressum* Sw. or *Axonopus aureus* Beauv. I believe the former should be taken as the type, though I think the two species are congeneric. Swartz species then should be known as *Axonopus compressus* (Sw.) Beauv.

Milium paniceum Sw. Prod. 24. 1788.

The type specimen is *Syntherisma filiformis* (L.) Nash (*Panicum filiforme* L.).

Milium digitatum Sw. Prod. 24. 1788.

The type specimen is *Syntherisma setosa* (Desv.) Nash as described in Nash's review of Syntherisma.[a] The long-exserted peduncles bear 2 to 4 slender spikes, with narrow rachis. It is well matched by Heller no. 4398 from Porto Rico and Wright no. 764 from Cuba. The spikelets are narrow, slightly exceeding 2 mm. in length. Swartz's name is earlier than the other names for this, hence the species becomes **Syntherisma digitata** (Sw.).

Milium villosum Sw. Prod. 24. 1788.

The type specimen is *Valota insularis* (L.) Chase (*Andropogon insulare* L.; *Panicum leucophaeum* H. B. K.).

Agrostis purpurascens Sw. Prod. 25. 1788.

The type specimen is *Sporobolus purpurascens* (Sw.) Hamilt., as described in Grisebach's Flora.

Manisuris granularis Sw. Prod. 25. 1788.

This is based on *Cenchrus granularis* L. The specimen belongs to this species, i. e., *Hackelochloa granularis* (L.) Kuntze.

Manisuris myuros L.

The specimen is a Rottboellia from the East Indies. Swartz gives no locality in the Prodromus.

Chloris cruciata Sw. Prod. 25. 1788.

This is based on *Agrostis cruciata* L. The specimen belongs to this species.

Chloris ciliata Sw. Prod. 25. 1788.

The type specimen belongs to this species as generally understood. It is well matched by Curtiss no. 600 from Cuba.

Chloris petraea Sw. Prod. 25. 1788.

The type specimen belongs to this species as generally understood, and as described in Grisebach's Flora. Doell[b] changes the name of this to *C. swartziana* on account of *C. petraea* Thunb., which, however, is a later name.

Chloris polydactyla Sw. Prod. 26. 1788.

This is based on *Andropogon polydactylon* L. The specimen belongs to that species.

Chloris radiata Sw. Prod. 26. 1788.

This is based on *Agrostis radiata* L. The specimen belongs to that species.

Chloris barbata Sw. Fl. Ind. Occ. **1:** 200. 1797.

This is based on *Andropogon barbatum* L. Mant. **2:** 302. 1771.

No specimen of this could be found in the Swartz herbarium.

Chloris virgata Sw. Fl. Ind. Occ. **1:** 203. 1797.

There is no specimen of this. A cover was found marked with the name, but containing nothing, and upon which some one has added an "0." From the description it would appear to be the species represented by plate 18 in Martius's Flora Brasiliensis, vol. 2, part 3. Grisebach includes it under *C. radiata* in his Flora, but from this species it is excluded by the statement in Swartz's diagnosis "corollina exteriore gibbosa, dorso apiceque ciliata."

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[a] The genus Syntherisma in North America, Bull. Torr. Club **25:** 300. 1898.

[b] In Mart. Fl. Bras. **2**[3]**:** 68. 1877.

Andropogon saccharoides Sw. Prod. 26. 1788.

There is no specimen of this from Swartz at Stockholm, but at Munich there is a specimen sent by Swartz and marked "prodr." It belongs to the species described under this name in Grisebach's Flora.

Andropogon fastigiatum Sw. Prod. 26. 1788.

The type specimen from "Jamaica, Swartz" belongs to this species, as described in Grisebach's Flora.

Andropogon brevifolium Sw. Prod. 26. 1788.

There is no specimen of this at Stockholm from Swartz, but at Munich there is a sheet of specimens from Jamaica sent by Swartz and marked "prodr." This is partly *A. brevifolium* as generally understood and as described by Swartz, and partly *A. leucostachys* H. B. K. In the absence of other evidence we may consider the Munich specimen as the type, excluding the portion which is *A. leucostachys*.

Cenchrus setosus Sw. Prod. 26. 1788.

The type specimen marked "fl. ind. occ." is *Pennisetum setosum* (Sw.) Rich. as described in Grisebach's Flora. Leeke refers this to *Pennisetum indicum* (Murr.) Kuntze.[a]

Poa glutinosa Sw. Prod. 26. 1788.

The type specimen from Swartz in herbarium Casström at Stockholm, marked "e Jamaica" is *Eragrostis glutinosa* (Sw.) Trin., *E. sudans* Griseb.

Poa prolifera Sw. Prod. 27. 1788.

Swartz's type of this is not in his herbarium, but there is a specimen marked "No. 17 *Poa prolifera* Sw. Carthagena Ins. Manzanillo, Febr. 1826 Billberg" which may be a compared specimen, as it is in the Swartz herbarium. It is *Eragrostis prolifera* (Sw.) Steud. as described in Grisebach's Flora. This is the same as Sloane's specimen mentioned under *Gramini tremulo affine*, etc., and illustrated in his plate 71, figure **1.**

THE GRASSES OF MICHAUX'S FLORA BOREALI-AMERICANA.

The plants collected by Andreas Michaux in North America in the latter part of the eighteenth century, which form the basis of his Flora Boreali-Americana published in 1803, are deposited in the herbarium of the Muséum d'Histoire Naturelle at Paris.

The species are here considered in the same sequence in which they occur in Michaux's work. Following the name of the species as published is the habitat as given upon the label accompanying the corresponding specimen in the herbarium. The herbarium contains the types of all except *Dilepyrum aristosum* Michx., *Poa crocata* Michx., and *Poa pectinacea* Michx. Richard distributed some of Michaux's plants to other herbaria. Many of these duplicates are found in the herbarium of Drake de Castillo at Paris. As will be seen from the notes accompanying certain species in the following list, it has not always been easy to determine which is the type specimen, especially in the critical species of Panicum. In certain cases the plant differs slightly from the description, or is from some other locality than the one cited. These cases are considered upon their merits in the notes accompanying each species.

[a] Zeitschr. Naturwiss. **79**: 17. 1907.

Cinna arundinacea L.

There is a specimen of *C. latifolia* (Trev.) Griseb., which is the plant described, and a panicle of *C. arundinacea* L. One label, which probably applies to the first specimen, reads: "A Sinu Hudsonis ad Pensylvaniam praesertim in borealibus Canada juxta lacus." A second label, which probably goes with the panicle, reads: "Cinna de Linneus. Cinna envoyé par Linn. a Jussieu qui lui avait eté apporté de Canada par Kalm."

Anthoxanthum odoratum L.

"In Pensylvania." The specimen belongs to this species.

Leersia oryzoides Sw.

"In excelsis montibus Carolina." The specimen belongs to this species. In another cover is a sheet of *L. virginica* which is labeled *L. oryzoides*, but without locality. It is to be noted that Michaux gives *L. virginica* as a synonym of *L. oryzoides*. By priority of Homalocenchrus Mieg. the name becomes *H. oryzoides* (L.) Poll.

Leersia lenticularis Michx.[a]

"In paludosis regionis Illinoensibus [sign for annual]."

The specimen[b] belongs to this species, i. e., *Homalocenchrus lenticularis* (Michx.) Scribn.

Dilepyrum aristosum Michx.

No specimen of this could be found. It is, according to description and tradition, *Brachyelytrum erectum* (Schreb.) Beauv. and is the type of the form known as *B. aristatum* Roem. & Schult. and *Muhlenbergia aristata* Pers., though the specific name is altered.

Dilepyrum minutiflorum Michx.

"In apricis, pratis Kentucky, Illinoensium pabulum praestantissimum in Kentucky." The specimen is *Muhlenbergia schreberi* Gmel. 1791 (*M. diffusa* Willd. 1797).

Aristida dichotoma Michx.

"In Carolina septentrionali juxta Lincoln." The specimen belongs to this species as described in our manuals. Lower glume 5 to 6 mm., upper glume 6 to 7 mm. long, slightly scabrous on keel and sides, the midnerve extended into a very short awn 0.3 mm. long; lemma sparsely appressed-pubescent, 3-nerved, 5 mm. long to base of awns; central awn 4 mm. long, curved at base to form a half coil, lateral awns erect, 1 mm. long.

Aristida stricta Michx.

"In Carolina [sign for perennial]." The specimen belongs to this species as described in our manuals. Glumes glabrous, 1-nerved or the lower obscurely 3-nerved at base, the lower 9 mm., the upper 11 mm. long, each extended into an awn about 2 mm. long; lemma glabrous or somewhat hispid below the awns, about 8 mm. long; awns about equal, spreading, 1.5 to 2 cm. long.

Aristida oligantha Michx.

"In apricis pratensibus regionis Illinoensium. Route des Illinois au fort Mossac lieux alternativement submergés." The specimen belongs to this species as described in our manuals. A scant specimen with a few spikelets. Lemma 1.5 cm. long; awns spreading, about 3.5 cm. long, nearly equal, all of them more or less curved or loosely coiled at base. On the same sheet is mounted a specimen of Sporobolus, apparently *S. vaginaeflorus* (Torr.) Wood.

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[a] All the species credited to Michaux were published as new species in his Flora Boreali-Americana, 1803. It is well known that this work was edited by L. C. Richard, for which reason many authors credit the new species to "Richard in Michaux."

[b] The specimens mentioned under the new species are types unless otherwise indicated.

Trichodium laxiflorum Michx.

"*Cornucopiae hyemalis* Walt. Hab. in pratensibus apricis a Canada ad Floridam [sign for male]." The specimen is *Agrostis hiemalis* (Walt.) B. S. P.

Trichodium decumbens Michx.

"Hab. in Carolina praesertim in umbrosis ripariis amnium. Trichod. (certissime) majus Cornucopiae perennans Walt." The specimen is *Agrostis perennans* (Walt.) Tuckerm.

Alopecurus aristulatus Michx.

No specimen labeled with this name could be found, but there is a very poor specimen of an Alopecurus from which the spikelets have fallen, leaving the axis of the spike, and this is labeled "*Alopecurus breviaristatus* Hab. in Canada ad ripas Lacus Champlain legi [sign for perennial]." As Michaux's description states that the plant has an erect culm and scarcely exserted awns, there is no doubt that the species is *Alopecurus aristulatus*, as usually understood.

Phalaris arundinacea L.

The specimen belongs to this species.

Phalaris villosa Michx.

"In Sabulosis Carolinae." The specimen is *Anthaenantia villosa* (Michx.) Beauv. as usually understood.

Paspalum setaceum Michx.

"In aridis apricis Carolina, Georgia [sign for perennial]." Terminal spike single, slightly curved; spikelets glabrous, 1.5 mm. long; blades pubescent. It belongs to the species described under this name in Small's Flora.

Paspalum debile Michx.

"Hab. in Carolina [sign for perennial]." Blades densely woolly on both sides, about 10 cm. long and 6 mm. wide; spike single, the culm smooth below the spike; spikelets 1.5 mm. long, pubescent. This is *Paspalum villosissimum* Nash,[a] which name should give way to that of Michaux. *P. debile* of Elliott's herbarium is *P. blepharophyllum* Nash (*P. debile* Michx.; Ell. Bot. S. C. & Ga. **1:** 105. 1816.)

Paspalum ciliatifolium Michx.

"In Carolina, Georgia." There are three specimens on the sheet. One without spikelets may be eliminated from consideration, also one with pubescent spikelets, since the description states that the spikelets are glabrous. The third specimen has ciliate blades, these somewhat hispid above, more so below, upper sheath ciliate on the margin; spikes 2; spikelets glabrous, 2 mm. long. This specimen, which I consider the type, is in poor condition, but appears to belong to the species described under this name in Small's Flora.

Paspalum praecox Walt.

"A Carolina ad Floridam." The specimen belongs to the species as described in Small's Flora.

Paspalum laeve Michx.

"In Georgia." The specimen, consisting of a single culm with three short spikes and smooth foliage, belongs to this species, as described in Small's Flora.

Paspalum floridanum Michx.

"Georgia et Florida." A single culm about 60 cm. high; lowermost sheath pubescent, the remainder glabrous; blades short, the middle blades about 18 cm. long; spikes 3, about 6 cm. long, erect, spikelets smooth, 3 mm. wide by 4 mm. long. This

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[a] In Small, Fl. So. States 73. 1903.

appears to be described in Small's Flora as *P. altissimum* Le Conte. *P. floridanum* as described in Small's Flora is a taller plant, with hirsute sheaths and longer spikes. It may be that these should be considered extreme forms of one species.

Paspalum plicatulum Michx.

"In Georgia, Florida." The specimen belongs to the species commonly so called.

Digitaria sanguinalis [Scop.]

"A Pensylvania ad Caroliniam [sign for annual]. Syntherisma precox Walt." This is *Syntherisma sanguinalis* (L.) Dulac. (*Panicum sanguinale* L.) Michaux cites no authority for his combination. It is to be noted that in his Flora he states under habitat: "in cultis [sign for annual]: in Florida maritima [sign for perennial]."

Digitaria pilosa Michx.

"In sabulosis Carolina, Georgia [sign for perennial]." This plant corresponds to the description, and the habitat is similar to that given in the book. The plant is *Syntherisma filiformis* (L.) Nash. (*Panicum filiforme* L.) A second sheet is referred to below under *Digitaria serotina*.

Digitaria paspalodes Michx.

"In pascuis aridis Carolinae." The specimen is *Paspalum distichum* L. The spikelets are pubescent.

Scribner,[a] misunderstanding this species, transferred the name to Paspalum as *P. paspaloides* (Michx.) Scribn., giving *P. elliottii* S. Wats. (which is *Paspalus furcatus* Flügge) as synonym. Nash [b] with the same conception of the species transferred the name to Anastrophus as *A. paspaloides* (Michx.) Nash, but described *P. furcatus* Flügge under it. *P. furcatus* Flügge becomes *Axonopus furcatus* (Flügge) Hitchc.[c]

Digitaria serotina Michx.

There is no sheet thus labeled, but the plant evidently referred to here is in the herbarium accompanied by a label "Digitaria pilosa. Hab. in Carolina, Georgia. Syntherisma serotina Walt." (Compare note under *D. pilosa*.) This specimen belongs to the species described in Small's Flora as *Syntherisma serotina*.

Panicum glaucum L.

Michaux appends to his description the sign for an annual; but all the specimens in his herbarium are *Chaetochloa imberbis* (Poir.) Scribn., a perennial species common in the Southern States.

Panicum crus galli L.

"Ad ripas rivorum Virginiae, Carolinae." This is the tall form with somewhat hirsute sheaths and long awns, now called "*Echinochloa walteri* (Pursh) Nash."

Panicum muricatum Michx.

"Lac. Champlain." This specimen which is the type is *Echinochloa crus-galli* (L.) Beauv. A second specimen of the same is labeled, "in Canada, Connecticut [sign for annual]." Both have rather short awns, and small panicles like the introduced form. Michaux distinguished this from the last, but applied Linnæus's name to the wrong species. Michaux's specimen is also the type of *Panicum pungens* Poir.[d]

Panicum hirtellum L.

"In umbrosis sylvarum a Carolina maritima ad Floridam." The specimen is *Oplismenus setarius* (Lam.) Roem. & Schult. as described in Small's Flora.

Panicum molle Michx.

"In sabulosis maritimis Florida." A second label, with diagnosis, reads "Lieux tres humides a 15 miles de St. Augustin." The specimen is *Eriochloa mollis* (Michx.)

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[a] Mem. Torr. Club **5**: 29. 1894.

[b] In Britton, Man. 75. 1901.

[c] Rhodora **8**: 205. 1906.

[d] Encycl. Suppl. **4**: 273. 1816.

Kunth as described in Small's Flora. There is only a panicle, but the pilose rachis is characteristic. According to the American code *Eriochloa mollis* is not a valid name. It must therefore be changed to **Eriochloa michauxii** (Roem. & Schult.). (*Panicum michauxii* Roem. & Schult. Syst. Veg. **2:** 427. 1817; *P. molle* Michx., not Sw., 1788). I do not find sufficient evidence for taking up the name Monachne[a] for this genus, accepted by Nash.[b] Monachne is based on *M. unilateralis* Beauv. and *Saccharum reptans* Lam. The former species has no description and can not be identified from the plate, though it is evidently some species of Eriochloa. The latter does not belong to the genus Eriochloa.

Panicum capillare L.

"A Pensylvania ad Carolinam." This is similar to the Linnæan plant, that is, the large erect form with broad leaves, as commonly understood.

Panicum dichotomiflorum Michx.

This is the species which in the United States has been going under the name of *Panicum proliferum* Lam. An examination of the latter plant in Lamarck's herbarium shows that it has been misunderstood. It is *Panicum miliare* of Asia. In the original description[c] the author states that the plant was cultivated in the jardin du Muséum and that its native country was unknown, although he ventured the guess that it might be from Virginia or some other part of North America. He also mentions seeing specimens of this in Vaillant's herbarium. The plant in Vaillant's herbarium is the same. This species was distributed in several of the larger herbaria under the name of *Panicum proliferum*. Pursh took up this name for our plant and has been followed by later authors. Michaux's name appears to be the oldest for this. The type of *P. dichotomiflorum* is in the herbarium of Drake de Castillo. It was sent by Richard, having been collected by Michaux "ad occidentem montium Alleganis," the type locality as published. The specimen (a very poor one) in the Michaux herbarium is labeled, "in regione Illinoensium."

Panicum virgatum L.

"A Pensylvania ad Georgiam ad ripas fluviorum, copiose in occidentalibus regionibus [sign for perennial]." A second label reads, "Pres le Debarquement du vieux * * * Sur Coper River, Carolina. * * * Rare en basse Carolina." The specimen belongs to this species.

Panicum anceps Michx.

"In herbosis humidis Carolina, Virginiae, Georgiae [sign for perennial]. Mêté avec le P. melicarium." The same as *Panicum rostratum* Muhl., a later name.

Panicum scoparium Lam.

"In pratis sylvestris Carolina [sign for perennial]." The specimen belongs to this species—that is, *Panicum viscidum* Ell. (1816) and is identical with Lamarck's type, which was received from Michaux.

Panicum latifolium L.

"In pratis sylvestris Virginiae, Carolinae, [sign for perennial]." A somewhat pubescent autumnal state of *Panicum boscii* Poir. (*Panicum porterianum* Nash, as described in recent manuals).

Panicum pubescens Lam.

"In pratis sylvestris Carolinae [sign for perennial]." The autumnal state of *Panicum scoparium* Lam. This was not found in the herbarium of Lamarck, who states that he saw the plant collected by Michaux in South Carolina. In the Drake de Castillo herbarium is a sheet of specimens from Michaux sent by Richard. The left-hand spec-

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[a] Beauv. Agrost. 49. 1812.

[b] Bull. Torr. Club **30:** 374. 1903.

[c] Lam. Encycl. **4:** 747. 1796.

imen is *Panicum lanuginosum* Ell. The other specimen is the same as the specimen of *P. pubescens* in the Michaux herbarium. Lamarck mentions having seen a dwarf specimen of this species in the herbarium of Vaillant, who received it from Sherard in 1721. This specimen is in the general herbarium of the Paris Museum. I was not able to identify this, but it is apparently different from any of our North American species. Although this Sherard specimen is the first mentioned, I do not think it should be taken as the type, as Lamarck was evidently describing Michaux's plant, though the description is modified by the Sherard plant, e. g., "La tige qui quelquefois n'a guère plus de six pouces de hauteur [the Sherard plant], s'élève d'autres fois à la hauteur d'un pied ou un peu plus." It is scarcely surprising that the vernal and autumnal states of *Panicum scoparium* should be described as different species.

Panicum nitidum Lam.

"In Pensylvania, Carolina." The specimen lacks spikelets, but is evidently *Panicum angustifolium* Ell. or one of the closely allied species such as *P. arenicoloides* Ashe. It is the vernal state, somewhat pubescent on lowermost portions, otherwise glabrous.

Panicum nitidum Lam. was first described in 1791.[a] The description is very meager and would not serve to identify the species. Only the panicle is described. The plant was collected by Fraser. A somewhat more extended description is given by Lamarck in the Encyclopedia,[b] but is only an amplification of the original with the addition of leaf characters. We are told, for example, that the stem is jointed and provided with leaves. The type specimen in the Lamarck herbarium consists of a panicle and the uppermost joint of the culm with its leaf. The blade is reflexed, and the node shows sparse reflexed hairs. It is *Panicum barbulatum* Ell., not Michx. (*P. subbarbulatum* Scribn. & Merrill). The panicle is purplish. The most important character given by Lamarck in his second description is the pubescence at juncture of the blade and sheath. The label on this plant is "de la Caroline[,] Fraser." This is evidently the type specimen. In the herbarium of Drake de Castillo there is a sheet obtained from Richard marked "Herb. Michaux from Pennsylvania" which is *Panicum tenue* Muhl. and probably is the specimen referred to by Lamarck[c] as a small-flowered variety collected by Michaux in Pennsylvania. *Panicum tenue* is not known to occur in Pennsylvania, and the location is probably an error. It will be noted that the published locality for *P. nitidum* is "Pennsylvania et Carolina," which accords with Michaux's label. Richard in sending out the plant may have shortened the locality to "Pennsylvania." *Panicum tenue* Muhl. occurs from southern Virginia southward. Scribner and Merrill[d] have discussed *Panicum nitidum* Lam. and identified it with *P. spretum* Schult. (*P. eatoni* Nash and *P. paucipilum* Nash.). The figure was taken from the plant in the Michaux herbarium, which, as stated above, is *P. angustifolium* Ell. The name *P. nitidum* Lam. must be used for what has been called *P. subbarbulatum* Scribn. & Merrill, while the plant described by Scribner and Merrill as *P. nitidum* must be called *P. spretum* Schult.

Panicum barbulatum Michx.

There are three specimens and two labels upon this sheet. The label upon which the name is written prominently at the top has "Hab. in Canada P. capillari affine ad ripas amnis: *Rivierre* a Jacques Cartier dicti legi." The other has "Rivierre a Jacques Cartier Route a Queb. P. barbulatum." The two larger plants are the vernal state of *P. gravius* Hitchc. & Chase. There is also a small specimen of *P. lindheimeri* Nash. In the Drake de Castillo herbarium is a specimen from Michaux sent out by Richard which is labeled *P. barbulatum*, "Caroline." This is *Panicum ashei* Pearson. There

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[a] Tabl. Encycl. **1**: 172.
[b] **4**: 748. 1797.
[c] Encycl. **4**: 748. 1797.
[d] U. S. Dept. Agr. Div. Agrost. Bull. **24**: 31. 1900.

is also on this sheet a small specimen of *P. lindheimeri* Nash. There are two other sheets from the same source, but without locality. One is *P. verrucosum* Muhl. The other appears to be *P. gravius* Hitchc. & Chase, though it may be *P. dichotomum*. In determining which plant shall be taken as the type it is to be noted that the locality given in the description is "Carolina." The only specimen having this locality upon the label is the one in the herbarium of Drake de Castillo, which is *P. ashei*. The description, however, mentions that the nodes are barbed, which applies to *P. gravius*, the plant in the Michaux herbarium, and to none of the others concerned. The specimen in the Michaux herbarium (excluding the small plant *P. lindheimeri*) has therefore been taken as the type, although it does not come from Carolina. Michaux evidently confused several species, but we must surely apply the name to a species with barbed nodes. The type is not what has been called *P. barbulatum* in all recent botanical works. This latter species has a smaller spikelet (1.5 mm. long), while *P. gravius* has spikelets 2 mm. long. The plant commonly called *P. barbulatum* must take the name *P. microcarpon* Muhl.; Ell. Bot. S. C. & Ga. 1816 (not Muhl. Gram. 1817, which is *P. polyanthes* Schult.).

Panicum ramulosum Michx.

"In pratis, cespitosis Carolinae." A poor specimen without spikelets, but certainly of the *angustifolium* group, apparently *P. angustifolium* Ell. This name antedates any of those applied to *P. angustifolium* and its allies, but on account of the fragmentary condition of the specimen it would not be wise to take it up. There is nothing in the description which will identify the plant any more certainly. In the herbarium of Drake de Castillo are two specimens from Michaux sent by Richard under this name. One is *P. dichotomum* L., the other is *P. lindheimeri* Nash. There is also a specimen of the latter species in the Berlin herbarium sent by Richard under the name of *P. ramulosum*.

Panicum melicarium Michx.

"In Carolina ad ripas rivorum affluviente mari inundatus [sign for perennial]." The specimen is not a Panicum at all, but *Panicularia elongata* (Torr.) Kuntze. The species has been much misunderstood and was rendered doubtful by the character mentioned in the description of a sterile rudiment of a second flower, a character not found in the genus Panicum. The spikelets of the specimen are past maturity and consist of empty glumes or with the lowermost florets still attached. This floret bears behind it the joint of the rachilla leading to the second floret, thus explaining the character mentioned by Michaux. This species becomes **Panicularia melicaria** (Michx.)

Panicum divaricatum Michx.

"In cespitosis excelsarum montium Carolinae Septentrionalis [sign for perennial]." This is *Festuca obtusa* Spreng. (*F. nutans* Spreng.). Michaux doubted that this was referable to Panicum. The spikelets are past maturity and like the preceding species consist of empty glumes or with the addition of the lowermost floret, which bears, of course, the joint of the rachilla. Michaux describes the spikelet as being 2-flowered, the second flower being a sterile pedicel. This species is of course quite different from *Panicum divaricatum* L.

Oryzopsis asperifolia Michx.

"In praeruptis et saxosis per tractus montium a sinu Hudsonis ad Canadam [sign for perennial]." The specimen belongs to the species described under this name in Gray's Manual.

Agrostis indica "Sw. obs."

"A Virginia maritima ad Floridam [sign for perennial]." The specimen is *Sporobolus indicus* (L.) R. Br.

Agrostis juncea Michx.

"In aridis Carolinae." The specimen is *Sporobolus junceus* (Michx.) Kunth, as usually understood.

Since Michaux's name is untenable on account of *Agrostis juncea* Lam. 1783, this species should be called *Sporobolus gracilis* (Trin.) Merrill, Rhodora **4:** 48. 1902 (*Vilfa gracilis* Trin.). I have examined the type in the Trinius herbarium at St. Petersburg, labeled "Zimmermann misit Carolina 1836."

Agrostis dispar Michx.

"In Carolina inferiore." The specimen is *Agrostis alba* L.

Agrostis aspera Michx.

"Illinois." The specimen is *Sporobolus longifolius* (Torr.) Wood, and not the species to which the name *Sporobolus asper* (Michx.) Kunth has been applied in recent manuals. The latter grass has an acuminate lemma and long-acuminate palea, while Michaux's description states that the flowers are muticous.

Apparently the earliest name for the plant which has been going under the name of *Sporobolus asper* is *Agrostis clandestina* Spreng. Mant. Prim. Fl. Hal. 32. 1807, which becomes **Sporobolus clandestinus** (Spreng.). Sprengel's type has not been examined, but the description leaves scarcely room for doubt. The plant is described as erect, and, what is particularly to the point, as having long-acuminate "corolla glumes." The plant was received from Muhlenberg, who also describes it in his Descriptio Graminum. Both Muhlenberg and Torrey distinguished between this and *Agrostis involuta* Muhl. (*A. aspera* Michx.; *A. longifolia* Torr.) using among other characters the shape of the lemma and palea, acuminate or awned in the first and obtuse in the second.

Agrostis lateriflora Michx.

"In praecipitibus saxosis fluminis Misissipi ripariis Illinoensibus [sign for perennial]." The specimen is *Muhlenbergia mexicana* (L.) Trin. The panicles are rather dense, somewhat branched, and more or less included in the sheaths at base.

Agrostis racemosa Michx.

"In ripis sabulosis inundatis fluminis Misissipi [sign for perennial]. Affinis A. lateriflora." The specimen is *Muhlenbergia racemosa* (Michx.) B. S. P. Glumes awned, longer than the acuminate lemma; panicle dense, more or less interrupted or lobed.

Stipa barbata Michx.

"In sylvis Virginiae Carolinae [sign for perennial]." The specimen is *Stipa avenacea* L. On this sheet is also a label which doubtless goes with the next, "Stipa sericea. Hab. in Carolina, Georgia maritima."

Stipa sericea Michx.

The specimen is *Muhlenbergia capillaris* (Lam.) Trin., as described in Small's Flora. Many of the sheets in Michaux's herbarium bear two labels, one with name and locality, the other with a diagnosis, and usually also the name written upon it somewhere as if added later. The sheet of *Stipa sericea* bears a label with diagnosis and name, but the other label seems to have been transferred to the sheet of *S. barbata*, mentioned above.

Stipa juncea Michx.

There is no specimen with this label, but among the Avenas is a sheet marked "Montagnes steril. a la hauteurs du Terres," which without doubt is the type. It bears the name *Avena uniflora* with the word *juncea* written above, and in the manuscript diagnosis it is compared with *Avena siberica* L., as is the case in the published description of *Stipa juncea*. The specimen is *Stipa macounii* Scribn. The description merely states that the flower is aristate, but the diagnosis upon the sheet states that the awn is three times as long as flower. Michaux's name can not be used on account of the earlier

S. juncea L., for which reason it was changed by Poiret to *S. canadensis.*[a] Hence this species should be called *Stipa canadensis* Poir. (*Stipa macounii* Scribn. in Macoun, Cat. Can. Pl. **5:** 390. 1890.) The species of Britton's Manual described as *Oryzopsis juncea* (Michx.) B. S. P. should be called **Oryzopsis pungens** (Torr.) (*Milium pungens* Torr. in Spreng. Neue Entdeck. **2:** 102. 1821.)

Erianthus saccharoides Michx.

There are two sheets of this, both labeled by Michaux, but no locality is given. They belong to the species described in Small's Flora under this name. This species was described by Walter in 1788 as *Anthoxanthum giganteum.* His specimen is among the few grasses preserved in his herbarium at the British Museum. In both types the panicle is tawny and the awn straight. The specific name can not be taken up because there is an *Erianthus giganteus* Muhl.,[b] based upon *Andropogon alopecuroides* L. and described in his Descriptio Graminum.[c] The awn is there stated to be twisted, as in the Linnæan plant.

Erianthus brevibarbis Michx.

"In collibus desertis ab amnio Wabash ad Ostium Missouri 5 diebus distantibus." The specimen belongs to the species described in Small's Flora under this name. The range as originally published is "in collibus Tennassée et Carolinae." The known range is from Delaware southward along the coast to Florida, and west to Louisiana. We do not know of its occurrence in southern Illinois, as given on Michaux's label.

Holcus odoratus L.

"In pratensibus Canada [sign for perennial]." The specimen is *Savastana odorata* (L.) Scribn.

Andropogon macrourum Michx.

"A Virginia ad Carolina [sign for perennial]." The specimen is *Andropogon glomeratus* (Walt.) B. S. P. This agrees with Walter's specimen in the British Museum in having roughened spathes, rather loose instead of tightly rolled as in the type specimen of *Andropogon corymbosus* (Chapm.) Nash (*A. macrourus corymbosus* Chapm.; Hack. in DC. Monogr. Phan. **6:** 409. 1889. Curtiss, N. A. Plants 3639c).

Andropogon dissitiflorum Michx.

"In Carolina Georgia Florida." The specimen is *Andropogon virginicus* L.

Andropogon ternarium Michx.

"In regione Wabash Georgia montosa &c." The specimen is *Andropogon argyraeus* Schult. which is *A. argenteus* Ell., not DC. There is a single rather fragmentary specimen which is undoubtedly this species. Besides the label quoted above, the sheet bears two others, but the name *A. ternarium* is questioned upon both. One gives the locality as "Wabash & Illinois," the other as Florida. As the diagnosis on the first of these two labels states that the staminate flower is pediceled, *A. furcatus* Muhl. may be referred to. However, the published locality is "in montosis Carolinae." Some of the awns of the specimen are somewhat twisted. There appears to be no reason why this name (as *A. ternarius*) should not be taken up in place of *A. argyraeus* Schult.

Andropogon scoparium Michx.

The label bears the name, but no locality. The published locality is "in aridis sylvarum Carolinae." The specimen belongs to this species as generally understood. The sheet bears another label with "Andropogon avenaceum," which has evidently been misplaced.

Andropogon avenaceum Michx.

"In regione Illinoensium [sign for perennial]." The specimen is *Sorghastrum nutans* (L.) Nash (*Andropogon nutans* L.), agreeing with the Linnæan specimen in having once-bent awns.

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[a] Encycl. **7:** 452. 1806. [b] Cat. 4. 1813. [c] 192. 1817.

Andropogon ambiguum Michx.

"In sabulosis Carol." The specimen is *Gymnopogon ambiguus* (Michx.) B. S. P. Branches floriferous from base.

Chloris petraea Sw.

"Carolinis & Florida." The specimen belongs to this species.

Chloris monostachya Michx.

There is no plant with this name, but there is a good specimen which answers to the description labeled *Chloris piperita*, without locality, however. The published locality is, "in sylvis Carolinae inferioris." Michaux states that the fresh plant has a peppery taste. The specimen is *Campulosus aromaticus* (Walt.) Scribn.

Chloris mucronata Michx.

"In cultis Carolinae." The specimen is *Dactyloctenium aegyptium* (L.) Willd.

Chloris curtipendula Michx.

"Hauteurs du Missouri et Poste Vincenne." The specimen is *Bouteloua curtipendula* (Michx.) Torr. as usually understood.

Tripsacum dactyloides L.

"Illinois, Basse Carolina." The specimen is of this species.

Tripsacum cylindricum Michx.

"In florida." The specimen is *Manisuris cylindrica* (Michx.) Kuntze (*Rottboellia cylindrica* (Michx.) Chapm. of our manuals).

Rottboellia dimidiata L.

No locality is given. The specimen is *Stenotaphrum secundatum* (Walt.) Kuntze.

Cenchrus tribuloides L.

No locality is given on the sheet but the specimen must have been collected along the seashore, for it has the large villous fruits characteristic of the true *C. tribuloides* L., which has been named *C. macrocephalus* (Doell) Scribn. and *C. vaginatus* Steud. The common inland form which has been going under the name of *C. tribuloides* should be called *C. carolinianus* Walt.

Aira flexuosa L.

"Connecticut." The specimen is *Deschampsia flexuosa* (L.) Trin.

Aira ambigua Michx.

"Riv. que tombent au Lac St. Jean." The specimen is *Deschampsia caespitosa* (L.) Beauv.

Aira melicoides Michx.

"Canada." The specimen is *Graphephorum melicoideum* (Michx.) Beauv. as described in Britton's Manual.

Aira obtusata Michx.

"In sabulosis Carolinae, Georgiae, Floridae [sign for perennial]. In Florida juxta domum Wiggin." The specimen is *Sphenopholis obtusata* (Michx.) Scribn. (*Eatonia obtusata* (Michx.) Gray as described in our manuals).

There are two individuals. One is slender, about a foot high, nearly glabrous throughout, with a narrow rather compact panicle; the other, more robust, but consisting only of panicle and upper leaf, is pubescent (under a lens) upon sheath and blade. This panicle, which is attached to a label with "herb. de M. de Pinckney 11.2," is lobed like the western form called *S. obtusata lobata* (Trin.) Scribn. The first specimen should be taken as the type, as it no doubt represents Michaux's own collection from Florida.

Professor Scribner has pointed out[a] that Eatonia of Rafinesque could not be the Eatonia of Endlicher and later authors, but he was not able to identify Eatonia Raf.

[a] Rhodora **8**: 137. 1906.

except as to the point that it was probably based on a species of Panicum. While going through the Panicums of the De Candolle herbarium I found a specimen of *Panicum virgatum* which was sent by Rafinesque and which was labeled *Eatonia purpurascens*. This is undoubtedly a duplicate type and fixes the identity of the genus Eatonia Raf. The original description applies well to the common purple form of this species found in brackish marshes along the coast.

Melica glabra Michx.

One label reads, "a Carolina ad floridam;" the other reads, "florida f. Matança No. 5." The plants are glabrous and have a simple slender raceme of about ten spikelets. Without much doubt *M. mutica* Walt. is the same.

Trachynotia cynosuroides Michx.

There are two labels, "Illinoensis" and "hauteurs des terres." The specimen belongs to the inland species with several somewhat scattered spikes and awned glumes, the lower being as long as the spikelet, which in most manuals is described under *Spartina cynosuroides* (L.) Willd. Michaux's description also applies to this species. Michaux, however, takes up Linnæus's specific name and bases his name *Trachynotia cynosuroides* upon *Dactylis cynosuroides* L. As has been already pointed out,[a] the Linnæan plant is the large seacoast form usually called *Spartina polystachya* (Michx.) Ell. This name must become a synonym of *Spartina cynosuroides* (L.) Willd., while the plant of the inland marshes previously known by this name must receive a different name. The name **Spartina michauxiana** is therefore proposed for the plant described by Michaux under the name of *Trachynotia cynosuroides* (not *Dactylis cynosuroides* L.). It has been proposed to take up the name *Spartina pectinata* Link, Jahrb. Gewächsk. **1**[3]: 92. 1820,[b] but *S. pectinata* was collected by Bosc probably in South Carolina, where *S. michauxiana* does not grow.

Trachynotia polystachya Michx.

"Basse Caroline." Another label reads, "Trachynotia (a dorso valvarum scabro) *Dactylis cynosuroides* L." Since both this and the preceding species have scabrous-keeled glumes, one suspects that the second label has been misplaced, or that Michaux was uncertain as to the identity of *Dactylis cynosuroides* L. As stated under the preceding species, the name *Spartina cynosuroides* (L.) Willd. should apply to this species, since Michaux's type of *Trachynotia polystachya* is identical with the type of *Dactylis cynosuroides* L. *Spartina cynosuroides* Willd. is also founded upon *Dactylis cynosuroides* L. Both Michaux and Willdenow describe, through error of determination, a different plant, that is, *Spartina michauxiana* Hitchc.

Trachynotia juncea Michx.

One label has the name only. A second label has "Dactylis sabulata bords des Creeks salés Basse Caroline." Spikes one or two; spikelets closely appressed upon the rachis. The specimen is *Spartina juncea* (Michx.) Ell. as described by Merrill,[c]

Eleusine indica [(L.) (Gaertn.)].

"In cultis a Carolina ad floridam." "Dans les champs Illinois." The specimen belongs to this species.

Eleusine mucronata Michx.

"Illinois." The specimen is *Leptochloa mucronata* (Michx.) Kunth as described in the manuals.

This is the same as *Leptochloa filiformis* (Pers.) Roem. & Schult. (*Eleusine filiformis* Pers. 1805.), the type of which is from "Americ. meridion." It may be the same as *Festuca filiformis* Lam.,[d] from "Amer. merid. Comm. D. Richard." The description

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[a] Bot. Gaz. **35**: 216. 1903.

[b] Piper, Contr. Nat. Herb. **11**: 145. 1906.

[c] N. A. Spec. Spartina, U. S. Dept. Agr. Bur. Pl. Ind. Bull. **9**: 12. 1902.

[d] Tabl. Encycl. **1**: 191. 1791.

is insufficient for identification and the type has not been examined. The species does not appear to be described by Lamarck in his Encyclopedia. The name *Leptochloa filiformis* has been applied to the species of southern Asia, which I think is different from our species.

Elymus virginicus L.

There is no locality given. The specimen is similar to the Linnæan type, having smooth lemmas and awns 2 to 2.5 cm. long.

Bromus canadensis Michx.

"Canada: Lac St. Jean." The specimen is *Bromus ciliatus* L. Lemmas pubescent on the margins, glabrous on the back.

Festuca myuros L.?

"Env. de Charleston." There are several specimens on the sheet. Some are *Festuca octoflora* Walt.; some are *F. sciurea* Nutt., the lemmas pubescent toward apex. The description applies to the latter.

Festuca bromoides L.?

"In pascuis juxta Charleston." The specimen is *Festuca octoflora* Walt.

Festuca fluitans L.

"Canada, Connecticut, Pensylvania." The specimen is *Panicularia borealis* Nash.

Festuca polystachya Michx.

"Illinois." The specimen is *Leptochloa fascicularis* (Lam.) Gray, the erect short-awned form.

Festuca distichophylla Michx.

"In maritimis Carolinae." The specimen is *Distichlis spicata* (L.) Greene, staminate form.

Festuca poaeoides Michx.

"In Canada [sign for perennial]." "Herb. de M. Jussieu Fleuve St. Laurent." The specimen is *Festuca elatior* L., the small form with slender panicle sometimes known as *F. pratensis* Huds.

Festuca diandra Michx.

"Illinois." The specimen belongs to the species described as *Diarrhena americana* Beauv. in Gray's Manual and *Korycarpus diandrus* (Michx.) Kuntze in Britton's Manual. The specific name is invalidated by *Festuca diandra* Moench[a]. Korycarpus was substituted for Diarrhena by Kuntze [b] on the strength of a citation by Lagasca ("Koryc. arundinaceus Ze. Ac. Matr. 1806" Lag. Nov. Gen. 4. 1816). I am unable to find any evidence that this name was published earlier than 1816. In the absence of such evidence it is best to use *Diarina festucoides* Raf. Med. Repos. **5**: 252. 1808, based on *Festuca diandra* Michx.

Poa capillaris L.

"Carol." The specimen is *Eragrostis refracta* (Muhl.) Scribn.

Poa crocata Michx.

No specimen of this could be found. The description applies to *Poa triflora* Gilib. (*P. serotina* Erhr.).

Poa hirsuta Michx.

"Carol." The specimen is *Eragrostis hirsuta* (Michx.) Nash as described in Small's Flora.

[a] Meth. 191. 1794.

[b] Rev. Gen. **2**: 772. 1891.

Poa seslerioides Michx.

The name does not appear on the label, but a sheet which answers to the description bears the locality "Carol." The plant is *Tridens flava* (L.) Hitchc. (*Triodea cuprea* Jacq.).[a]

Poa compressa L.

"Environs de Montreal et La Prairie extremité du lac Champlain." The specimen belongs to this species.

Poa striata Michx.

"Pensylvania, Virginia, Carolina." The specimen is *Panicularia nervata* (Willd.) Kuntze (*Poa nervata* Willd. 1797).

Poa pectinacea Michx.

No specimen of this could be found. This is unfortunate, as the species is somewhat uncertain. The description points toward the species generally understood and described under the name *Eragrostis pectinacea* in our manuals. But this is a perennial, while Michaux places the sign for annual after the locality, which is given as Illinois. Research in other herbaria at Paris, such as the General Herbarium and the herbarium of Drake de Castillo, may yield specimens collected by Michaux and sent out by Richard, which will determine the identity of the species.

Poa reptans Michx.

"Rivierre Kaskaskia in limosis ripariis hujus amnii," the pistillate plant. "In limosis ripariis amnium regionis Illinoensibus [sign for annual]," the staminate plant. These are *Eragrostis hypnoides* (Lam.) B. S. P. Lamarck[b] states that his plant is the same as the one collected by Michaux on the Kaskaskia. Lamarck's first description of this, *Poa hypnoides*, appeared several years earlier.[c]

Uniola latifolia Michx.

"Illinois." This belongs to this species as described in our manuals. No specimen was found from the published locality, the Alleghany Mountains.

Uniola gracilis Michx.

No locality is given. The same as *Holcus laxus* L. in the Linnæan herbarium, now called *Uniola laxa* (L.) B. S. P.

Uniola maritima Michx.

"Carol. sur la bord de la mer. Sea-side oat." The specimen is *Uniola paniculata* L.

Briza canadensis Michx.

No locality is given. The specimen is *Panicularia canadensis* (Michx.) Kuntze as described in Britton's Manual.

Briza eragrostis L.

"Carol." The specimen is *Eragrostis eragrostis* (L.) Karst. (*Eragrostis megastachya* (Koel.) Link).

Avena mollis Michx.

"Montreal." The specimen is *Trisetum spicatum* (L.) Richter (*T. subspicatum* (L.) Beauv.) The sheaths and blades are pubescent. In some manuals the glabrous form is given this name while the pubescent form is made a variety. However, the Linnæan specimen of *Aira spicata* is pubescent.

Avena glumosa Michx.

"A Canada et Carolina [sign for perennial]." The specimen is *Danthonia spicata* (L.) Beauv. The plant is glabrous.

[a] See above, page 120. [b] Encycl. **5:** 88. 1804. [c] Tabl. Encycl. **1:** 185. 1791.

Avena palustris Michx.

"Georgia Lieux humides." The specimen is *Sphenopholis palustris* (Michx.) Scribn. (*Trisetum palustre* (Michx.) Torr.).[a]

Avena striata Michx.

"A sinu Hudsonis ad Lacus Mistassins," "Lac des Cygnes, Montagn. ent. la Baye de Hudson et le Canada Mistassins." The specimen belongs to this species as generally understood. It is, however, a Melica and would be, according to the Vienna Code, *M. striata* (Michx.) Hitchc.[b] By the American Code this name is invalidated by *Avena striata* Lam. 1783, and must be changed to **Melica purpurascens** (Torr.) (*Trisetum purpurascens* Torr. Fl. U. S. **1:** 127. 1823; *Avena striata* Michx., not Lam.).

Arundo canadensis Michx.

"A Sinu Hudsonis ad Canadam praesertim ad ripas lacuum [sign for perennial]." The specimen is *Calamagrostis canadensis* (Michx.) Beauv. as described in our manuals.

Arundo arenaria L.

"Ad ripas fluminis S. Laurentii a mare affluvienti inundatus." The specimen is *Ammophila arenaria* (L.) Link.

Arundinaria macrosperma Michx.

"Gramen altissimum ramosum a Virginia ad Floridam & in occidentalibus juxta fluviis ab Illinoensibus ad ostium Misissipi [sign for undershrub]." The specimen is fragmentary and one can not be certain which species of Arundinaria it represents. Michaux probably included the large and small canes in one species. As he described the plants as being very high, we may retain this names for the tall cane, as is done in our manuals.

Zizania miliacea Michx.

There is no sheet bearing this name, but the plant described by Michaux bears the label "Zizania palustris," without locality. It is *Zizaniopsis miliacea* (Michx.) Doell & Aschers as described in Small's Flora.

Zizania clavulosa Michx.

This name does not appear upon any sheet, but a corresponding specimen, answering to the description, is marked *Zizania aquatica*, "Lac Champlain New Jersey Carolines Illinois & Lac d'Am." It is *Zizania palustris* L., the large, broad-leaved form.

Zizania fluitans Michx.

"In stagnantibus Carolinae Georgiae et alibi copiosissime juxta Charleston." The specimen is *Hydrochloa carolinensis* Beauv. (*H. fluitans* (Michx.) Nash.) Michaux's specific name can not be taken up on account of the earlier *H. fluitans* Hartm. Michaux's published locality, "ad lacum Champlain," must be an error, for the plant is not known to occur in the north.

Manisuris granularis Sw.

"In Carolina." The specimen is *Hackelochloa granularis* (L.) Kuntze.

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[a] See Scribner, Rhodora **8:** 145. 1906.

[b] Rhodora **8:** 211. 1906.

LIST OF NEW NAMES AND THOSE REPLACING NAMES IN CURRENT USE.

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SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM

CONTRIBUTIONS

FROM THE

UNITED STATES NATIONAL HERBARIUM

VOLUME XII, PART 4

THE MEXICAN AND CENTRAL AMERICAN SPECIES OF SAPIUM

By HENRY PITTIER

WASHINGTON
GOVERNMENT PRINTING OFFICE
1908

BULLETIN OF THE UNITED STATES NATIONAL MUSEUM:

ISSUED OCTOBER 6, 1908.

II

PREFACE.

During the past few years much study has been bestowed upon plants which furnish the rubber of commerce. This has shown that many of these are unknown botanically, that those which have been described have often been placed in wrong genera, and that the number of genera and species which may furnish rubber is apparently much larger than has been supposed. It has been discovered not only that several species of the genus Sapium produce a part of the rubber of commerce, but that the genus is a very large one, and it will doubtless be found that more of its species are capable of yielding a satisfactory raw product.

The accompanying paper on the species of Sapium of Mexico and Central America, by Mr. Henry Pittier, is therefore, in view of the growing demand for more rubber, timely, and the contents are such as to make it an important contribution to this subject. Most of the new species here proposed were first studied by Prof. Karl Schumann, but his death occurred before they had been published, or even manuscript upon them prepared. Mr. Pittier has described the new species recognized by Professor Schumann, together with two additional species distinguished by himself, and has added, with appropriate notes, descriptions of two already known.

J. N. Rose, *Acting Curator.*

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THE MEXICAN AND CENTRAL AMERICAN SPECIES OF SAPIUM.

By Henry Pittier.

INTRODUCTION.

Among the Costa Rican species of Sapium there is one common in the central valley of San José and known to the natives under the name of *yós* or *iós*, a word that probably originated in the extinct Güetarú language. The milk of this species is used by boys as a bird-lime.[a] Small sticks are smeared with the fresh milk and placed near some food that will attract the birds, and if any of these happens to alight on one of the sticks, its feet adhere so strongly that it can not fly away. With the object of ascertaining the presence or absence of rubber in the milk of that species, I started a few years ago some preliminary investigations. The subject of my first few experiments was a tree growing in a hedge near San José. Its trunk was about 30 centimeters in diameter, and it measured nearly 3 meters from the ground to the limbs, but it had been kept cut back with the hedge, so that the ramification was all new growth with very large, fleshy leaves. These furnished an abundance of a watery latex which, after desiccation, was found to contain traces of rubber and a very large amount of a sticky, resinous substance. Later I realized through personal experience the fact, already very well known, that the milk of young Castilla trees and other rubber plants also yields mostly resinous substances and comparatively little rubber, so that the conclusiveness of these first experiments against the utility of the Costa Rican Sapium became doubtful.

I had no opportunity, however, to continue my researches under better conditions and had almost adopted the opinion that none but the high Andean species of Sapium, known from Colombia and Ecuador, were rubber-producing trees, when my attention was attracted by various articles from different sources, all of which contributed to throw new light on the really important rôle of several species of this genus as contributors to the supply of South American rubber.

[a] The milk was used for the same purpose in Jamaica. (See footnote, p. 162.)

As early as 1901 Dr. J. Huber, at present director of the Museu Goeldi at Para, called attention to several rubber-yielding species of Sapium from the Amazon basin.[a] His paper was apparently ignored by Professor Jumelle, who nevertheless gives in his book[b] an excellent account of the Brazilian rubber-yielding *tapurú*, or *murupita*, which he also places, although with doubt, in the genus Sapium. According to this author, much of the *borracha*, *fina* and *entrefina*, coming into market through Manaos, and heretofore considered a product of several species of Hevea, actually proceeds from the *tapurú*, or *murupita*, tree.

Further investigations of Doctor Huber[c] confirmed Professor Jumelle's inferences and contributed several important additions to the facts already known. At about the same time Dr. Ernst Ule[d] increased by two the number of the Brazilian species of Sapium known to produce rubber. In Ecuador and Colombia no less than five species of this genus are known to yield good rubber, and in a recently written article Mr. A. W. Bartlett[e] states that the milk of *S. jenmani* Hemsl., growing in the lowlands of British Guiana, yields a rubber of excellent quality, long known to the natives, and that this constitutes to-day the bulk of the rubber supply of the colony. Thus at least nine South American species of the genus Sapium are to-day known to yield rubber, while the Central American species that have scarcely been investigated botanically may contribute important additions to the list.

Shortly before leaving Costa Rica I received a small sample of an apparently excellent rubber, said to have been extracted from Sapium, or *yós*, trees, the exact location of which could not be given. This of course had the effect of renewing my interest in the matter, and I felt also stimulated to further investigations in that line by Doctor Preuss's discovery of several new rubber-yielding species of Sapium on the Pacific coast of tropical South America.[f] A large number of botanical specimens were collected both by myself and by my former assistant, Mr. A. Tonduz, most of which were found to constitute new species. They were turned over to Dr. Karl Schumann for determination, but their systematic study was unfortunately interrupted by the untimely death of that botanist, while my departure from Costa Rica put an end to any further attempt on my part to ascertain the economic value of these species.

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[a] Bol. Museu Paraense (Goeldi) **3:** 365–368. 1901.

[b] Jumelle, Henri. Les plantes à caoutchouc et à gutta, exploitation, culture et commerce dans tous les pays chauds. Paris, 1903.

[c] Bol. Museu Goeldi (Paraense) **4:** 485. 1904–1906.

[d] Ule, Ernst. Kautschukgewinnung am Amazonenstrome. Berlin, 1904. The same, Kautschukgewinnung und Kautschukhandel am Amazonenstrome. Beiheft zum Tropenpflanzer, Januar, 1905.

[e] Journ. Board Agr. Brit. Guian. **1:** 1–12. 1907.

[f] Published in his Expedition nach Central- und Südamerika, 384–391. 1901.

This is, I believe, enough to show on the one hand that the apparent scarcity of Sapium species in and north of Costa Rica must be attributed mainly to our deficient knowledge of the flora, and on the other that there is really no reason why some of these unknown or little-known Central American species should not also be found to yield commercial rubber. It is in anticipation of further researches on the subject that the present revision of the species known from Middle America has been undertaken.

In the preparation of this paper I have used the material in the United States National Herbarium, and also in the collections that were kindly loaned me by the Gray Herbarium, the Field Museum of Natural History, Capt. John Donnell Smith, of Baltimore, and the Instituto físico-geográfico, of Costa Rica. The last collection contained no less than seven new species, five of which had been named, although not described, by Dr. Karl Schumann. Although it is not unlikely that upon further investigation the number of these Costa Rican species will need to be reduced, I prefer to maintain here the specific divisions established by the lamented Berlin botanist. Not long ago one of the forms distinguished by him under the name of *S. pycnostachys* was described by Huber,[a] who gave it the less desirable name of *S. pittieri*.

Regarding the general systematic treatment of the genus Sapium, it must be said that it is still very imperfectly known. Not only are the differences between the numerous species often very vaguely defined, and many species have been included under one name, but even the limits of the genus do not seem to be always understood, as there has been a continual confusion between Sapium, Excoecaria, Sebastiania, and Stillingia.[b] This is due, without doubt, to the absence in most herbaria of sufficiently extensive material.

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[a] Bull. Herb. Boiss. II. 6: 350. 1906.

[b] As understood to-day, the genus Excoecaria is limited to the Eastern Hemisphere, with *E. agallocha* as the type species. It differs from Sapium by characters of seemingly little importance and perhaps not yet well defined. Most of the species are dioecious; the divisions of the male calyx are distinct, very narrow, and usually three in number; the clusters of the male flowers and the pistillate flowers are pedicellate, each cluster of the first seldom containing more than three flowers; the seeds are smooth. Mueller of Argau (in Mart. Fl. Bras. 11²: 611–630) includes all the American species in this genus, of which Sapium is then only a subdivision. But this view has not been sustained by Bentham and Hooker and the more recent writers.

Sebastiania is also a very near related genus, mostly from extratropical America. It differs at first sight from Sapium by the reduced size of the plant, the absence of petiolar and bracteal glands, the smooth seeds, and the bivalvate dehiscence of the capsules. In Stillingia, another member of the same group, we note the absence of the persistent axial column of the capsule and marked differences in the glandular apparatus; also the American species of that genus are mostly extratropical and somewhat distinct in their habits.

As a general rule, the species of Sapium are exceedingly polymorphic. As in Ficus, the habit of the younger trees and the size and texture of their leaves are quite distinct from those of old individuals. On the same tree we have often large thick leaves on the young shoots, medium-sized and rather coarse leaves on the branchlets of older growth, and again small, narrow, and thin leaves at the base of the new inflorescences. The general shape, the indentation of the margin, and the glandular apparatus vary correspondingly. And again, between trees of the same species but growing in distinct stations, we note striking variations in the same series of characters. But this is not all; it is very likely that most of the species, if not all, are proterandrous, the first flowers of the season being exclusively staminate, while a second flowering that immediately follows shows the usual androgynous spikes. This fact has given rise to the belief that some species are dioecious, which is certainly not the case, at least in the species of the subgenus Eusapium.

The generic name Sapium was used for the first time by Patrick Browne in 1756,[a] being applied to one of the Jamaican species, although without specific designation. In the second edition of the same work, published in 1789, the Linnæan name of *Hippomane glandulosa*[b] is given as corresponding to Browne's "gum tree," but as early as 1762 Jacquin[c] had upheld Sapium as a generic name and

[a] The Natural History of Jamaica 338. 1756. Browne gives the following account of the genus without reference to any species:

"SAPIUM 1.—Arboreum, foliis ellipticis, glabris, petiolis biglandulis, floribus spicatis.

"THE GUM TREE.

"Flores alii masculini, alii feminini, in iisdem spicis; illi e superiore spicae parte, oriuntur; hi vero infra enascuntur.

"Mas.

"Periantium nullum. Corolla nulla. Stamina: E singula lacuna biglandula emergunt filamenta quatuor, quinque, vel sex, brevissima; antheris globosis instructa.

"Femina.

"Periantium: E lacunis paucis biglandulosis, circa basim spicae digestis, emergunt periantia totidem ventricosa, minima quadridentata. Corolla nulla. Pistillum: Germen oblongum, intra calicem situm; stylus brevis tripartitus, stigmata simplicia. Pericarpium: Capsula subrotunda, obtuse triloba, trilocularis, seminibus tribus solitariis referta.

"This tree grows to a very considerable size and yields a great quantity of resin of a thick, sticky consistence, dirty color, opaque, and of little smell, which generally serves for the boiling-house lamps in every part of the country where the tree is frequent, and is much used for bird lime, which purpose it is observed to answer extremely well. The wood is soft and coarse and not much esteemed."

[b] L. Sp. Pl. 1191. 1753.

[c] Enum. Pl. Carib. 31. 1762; Select. Stirp. Am. 249. 1763.

identified the Jamaican Sapium with his *S. aucuparium*. So it happens that although Browne's publication was not made with all the technical requirements, Sapium is generally accepted as a well-founded genus, and the Jamaican species, *S. caribaeum* of the modern botanists, is perhaps entitled to be considered as the typical one, unless Jacquin's true *S. aucuparium*, from Cartagena, be taken, on the ground that it seems to be the first to receive a definite binomial name under the genus. Later, several extra-American genera—among them Triadica, Falconeria, and Conosapium, none of which I intend to discuss here—were referred to this genus as subgenera. This is the view taken by Doctor Pax in his treatment of Sapium in Engler and Prantl's Pflanzenfamilien.[a]

In its restricted sense (Eusapium) the genus under consideration includes large trees, with alternate smooth leaves usually bearing a pair of glands at the base of the lamina and provided with caducous stipules. Most species, if not all, are proterandrous, having a first bloom with only male flowers, while in a second flowering, directly following, occur both pistillate and staminate flowers. The inflorescence consists of spiciform, glanduliferous, terminal or axillary racemes, growing either solitary or in clusters. On the androgynous spikes the pistillate flowers are always at the base.

The staminate flowers are in clusters of at least three, but mostly more in the Central American species, each cluster under a more or less developed bract, with a pair of large, discoid, sessile glands. The calyx is irregularly indented or lobed and includes two or three stamens (always two in the species here described).

The pistillate flowers are solitary under each bract, but in variable numbers (1–16) at the base of each spike. The calyx is usually bottle-shaped and more or less deeply divided. The ovary is superior, three-celled, with three styles, adnate at the base, or completely free.

The fruit is a three-coccous capsule, smooth outside, dehiscent. The seeds are single in each cell, rather rounded or lentiform, and with a more or less distinct caruncle. The albumen is carnose.

At present the genus Sapium includes about fifty-eight recognized species, distributed all over tropical America from Mexico to Argentina, with altitudinal ranges varying between 0 and 2,500 meters. It is likely that a goodly number of other forms have hitherto escaped the attention of botanists. The present paper deals only with the nine Middle American species known to-day.

---

[a] 3[5]: 97.

DESCRIPTIONS OF SPECIES.

ANALYTIC KEY.

Spikes in clusters of 3 to 5 at the ends of the branchlets.
- Petiolar glands fully developed ..... 1. *S. pleiostachys.*
- Petiolar glands none or rudimentary ..... 2. *S. anadenum.*

Spikes single on each branchlet.
- Leaves distinctly lanceolate.
  - Capsules sessile ..... 3. *S. mexicanum.*
  - Capsules pedicellate.
    - Apical glands well developed ..... 4. *S. thelocarpum.*
    - Apical glands none ..... 5. *S. pedicellatum.*
- Leaves short and rather broad.
  - Petiolar glands distinctly on margin of blade ..... 6. *S. pittieri.*
  - Petiolar glands on petioles.
    - Spikes thick and rather short ..... 7. *S. pachystachys.*
    - Spikes rather long and slender.
      - Leaves small, oval-elliptic, acumen reflexed .... 8. *S. oligoneurum.*
      - Leaves medium, broadly ovate, acumen uguliform ..... 9. *S. sulcijerum.*

1. Sapium pleiostachys Schumann & Pittier, sp. nov. PLATE X. FIGURE 7.

A medium-sized or even large tree, with ascending limbs and elongated crown; young shoots reddish, short; leaves more or less coriaceous and thick according to age; petioles rather thick, 1.5 to 3 cm. long; petiolar glands short and obtuse; leaf blades 6 to 15 cm. long, 3 to 5.5 cm. broad, obovate or oval-elliptic, cuneate or slightly rounded at base, acuminate but with rounded, flat tip; margins smooth at blooming time, distinctly sinuate on fructiferous twigs; secondary nerves rather close, arcuate, very salient on lower face; stipules small, scarious, ovate-acuminate; floral spikes androgynous, 7 to 9 cm. long, in terminal clusters of 3 to 5; rachis and other parts of inflorescence purplish-tinged; floral glands paired, discoid; pistillate flowers 6 to 8 at base of spikes, their involucral bracts broadly obovate, the calyx bottle-shaped, inclosing the whole of ovary and style; ovary subsessile or very shortly stipitate, ovate-elongated; style rather long, persistent, stigmas well-developed, spiral; staminate flowers 6 to 8 in each cluster, the calyx of the open flowers elongated at base in a pedicel-like tube; filaments short; anthers rather small, half-inclosed, deep purple; anthesis successive, beginning at center of cluster; capsules sessile, smooth, 7 to 8 mm. high, 8 to 9 mm. in diameter; seeds lenticular, black, obscurely verrucose, 4 to 5 mm. in diameter and 3.3 to 5 mm. thick, with a slender caruncula at the apex.

a *b* *c*

FIG. 7.—*Sapium pleiostachys*. *a*, Pistillate flower; *b*, bract; *c*, staminate flower.

Costa Rica: Forests of Golfito de Osa, close to seashore, H. Pittier, March, 1896, flowers (Inst. fís.-geog., Costa Rica, no. 9906; U. S. National Herbarium, no. 578902, type). Guatemala: San Felipe, Departamento Retalhuleu, altitude 700 meters, fruit, April, 1892 (John Donnell Smith, no. 2607).

2. Sapium anadenum Pittier, sp. nov. PLATE XI. FIGURE 8.

A tree 15 to 20 meters high, with horizontal limbs and rounded crown; petioles slender, 1.5 to 3 cm. long; petiolar glands mostly absent or rudimentary; leaf blades oval-elliptic or lanceolate, rounded at base, narrowing into a slightly incurved tip, chartaceous, shiny on both faces, 4 to 9 cm. long, 2.5 to 4 cm. broad, obscurely sinu-

SAPIUM PLEIOSTACHYS SCHUMANN & PITTIER.

SAPIUM ANADENUM PITTIER.

SAPIUM MEXICANUM HEMSL.

ate on the margin; floral spikes in terminal clusters of 3 to 5, androgynous or sometimes only staminate; floral glands discoid or transversly elliptic; pistillate flowers pedicellate, 5 to 7 at base of spikes; the bracts scarious, broadly cordiform, the calyx greenish yellow, closely contiguous to the ovary, with two acute tips, the ovary ovoid with a short style and smaller, nearly erect, exserted stigmas; staminate flowers 6 or 7 in each cluster, pedicellate, the calyx divisions oval, pale yellow; stamens long-exserted; filaments thick, clavate; anthers small, reniform, pale yellow or tinged with purple; capsule and seeds not known.

Costa Rica: Hacienda Valverde at Orosí, altitude 1,200 meters, H. Pittier, March, 1902, flowers (Inst. fís.-geog., Costa Rica, no. 16366; U. S. National Herbarium, no. 578045, type).

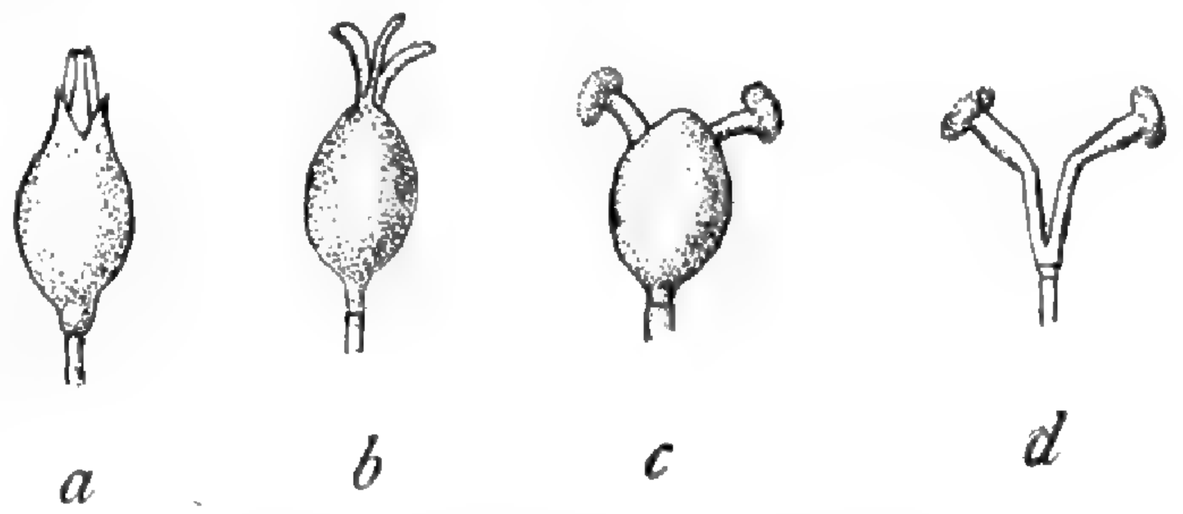


FIG. 8.—*Sapium anadenum*. *a*, Immature pistillate flower; *b*, pistil; *c*, staminate flower; *d*, stamens.

These specimens were placed with *S. pachystachys* by Professor Schumann, but they differ widely from that species in the form and texture of the leaf, their clustered spikes, and the characters of the pistillate flowers. I would rather place it near *S. pleiostachys*, with which it may prove identical upon examination of more complete material.

3. Sapium mexicanum Hemsl. in Hook. Ic. Pl. IV. **27**: *pl. 2680*. 1901. PLATE XII.

"An entirely glabrous tree, the fructiferous branchlets being rather thick and smooth; leaves long-petiolate, coriaceous, flexible, pale green, oblong-lanceolate, 10 to 20 cm. long, including the petioles, and up to 3.5 cm. broad [petioles 2.5 to 3.5 cm., leaf blades 6 to 12 cm. long, 2.5 to 3.5 cm. broad, as seen by me.—H. P.], subobtuse and eglandular at the apex, cuneate or rounded at the base; margin minutely callous-crenate in its whole length; primary lateral veins numerous, slender, curved, obscurely connected near the margin; petioles slender, 2 to 3 cm. long, with 2 thick, subglobose glands at the summit; stipules broad, squamiform, long-persistent; spikes androgynous, simple, terminal or pseudoterminal, solitary, longer than the leaves; bracts small, provided with peltate, oval, geminate glands; pistillate flowers 3 or 4 at the base of the spikes, solitary in the axils of the bracts, sessile, the remaining flowers staminate, in clusters of 9 to 12 under each bract; styles free from the base, thick, recurved, soon deciduous; capsules very shortly pedicellate, ligneous, subglobose, loculicidally dehiscent from a persistent axis, about 38 mm. in diameter when expanded, the valves at length very spreading, long-persistent; seeds ovoid, 10 to 13 mm. long [8.1 to 8.2 mm. long, 6.1 to 6.2 mm. thick, as seen by me.—H. P.], slightly corrugated under the cinnabar-red testa; embryo central; cotyledons orbicular."—Hemsley, loc. cit.

Mexico: Lava fields near Cuernavaca, Morelos, altitude 1,500 meters, C. G. Pringle, no. 6336, June 17 and September 23, 1896, flowers; C. G. Pringle, no. 13195, June 8, 1904, flowers and fruit; E. W. D. Holway, no. 3517, September 28, 1899, fruit (Gray Herbarium). Huber[a] has suggested the substitution of the name *S. macrocarpum* Sw. for *S. mexicanum* Hemsl. But I do not feel altogether convinced that the short and incomplete description of Swartz applies more to the very complete materials of the species collected by Pringle and Holway than to Huber's new species, *S. pedicellatum*. In view of the doubt, I find it advisable to maintain Hemsley's name.

Until better material has been supplied, *Sapium lateriflorum* Hemsl.[b] must be considered as a species of doubtful standing. Hemsley himself hesitates as to the

[a] Bull. Herb. Boiss. II. **6**: 352. 1906.

[b] Hook. Ic. Pl. IV. **27**: under *pl. 2680*. 1901.

validity of the main specific character given by him, i. e., the laterality of the spikes, and in referring to a genus that is so noteworthy for individual variations in the form and size of the leaves still less weight should be given to characters taken from these. The remaining parts of the description apply in a general way to several of the Central American species.

4. Sapium thelocarpum Schumann & Pittier, sp. nov. PLATE XIII.

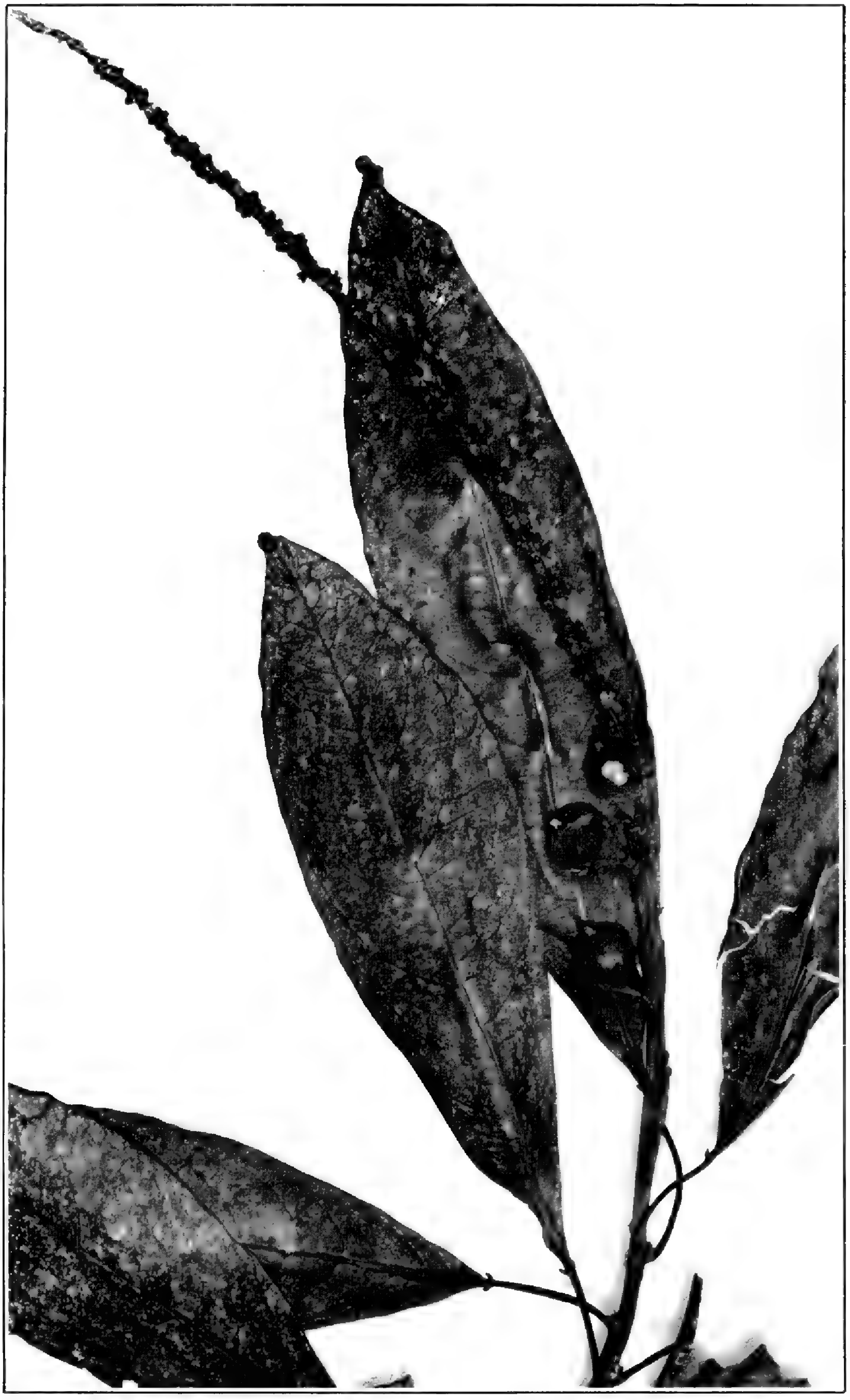
A tree often reaching 20 meters in height, with horizontal or slightly ascending limbs; new growth leaves rather large; petioles slender, 1.5 to 3 mm. long, with petiolar glands 1 mm. long, some 2 mm. distant from the lamina; lamina broadly elliptic, 7 to 14 cm. long, 4 to 7 cm. broad, rounded at base, obtusely acuminate, its margin obtusely sinuate; leaves of floral twigs obovate, 7 to 14 cm. long, 2 to 4 cm. broad, long-cuneate or rounded at base, abruptly acuminate with a well-developed gland on upper surface of incurvate tip; margin obscurely sinuate-serrate and revolute; larger secondary nerves rather distant, arcuate, forming a fine, prominent network on the lower, paler green face of the blade; spikes single, terminal, reaching 22 cm. in length, androgynous, with 3 to 4 pistillate flowers at base of each spike or only male; bracts not over 1 mm. long, ovate-acuminate; ovary distinctly pear-shaped; style persistent; staminate flowers very small, in clusters of 5 or less, with orbicular glands at base; capsules stipitate, 4 or less on each spike, pyriform, apparently with only 2 fertile cells; mature seeds not known.

Costa Rica: Along Río Ciruelas, on the southern slope of Barba Volcano, altitude about 1,800 meters, A. Tonduz, young shoot with unusually large leaves (Inst. fís.-geog. Costa Rica, no. 2219); hedges at La Verbena, near San José, altitude 1,100 meters, A. Tonduz, August, 1894, fruit (U. S. National Herbarium, no. 578901, type; Inst. fís.-geog. Costa Rica, no. 8857); along Río Torres near San José, altitude 1,100 meters, A. Tonduz, July, 1896, young fruits and male flowers (Inst. fís.-geog. Costa Rica, no. 10112).

The late Doctor Schumann labeled with the above name only no. 8857, while he named no. 10112 *S. biglandulosum* Müll. Arg. This last number does not agree with Müller's description, and I fail to find a difference between the two specimens except that in 10112 the leaf indentation is perhaps less obtuse and the base of the blade more rounded and broader. The specimens of both numbers agree in their other characters and to my knowledge both represent the one common species met with almost everywhere in the valley known as the Central Plateau of Costa Rica. The same can be said of no. 2219, placed by Schumann in a third species, *S. aucuparium* Jacq. This specimen consists merely of young leaves of what is certainly, according to my experience, the species just described. Insufficient attention has perhaps been paid to the fact that Sapium, like Ficus, Castilla, and some other trees, has much larger leaves on shoots or on young specimens than on the adult individuals

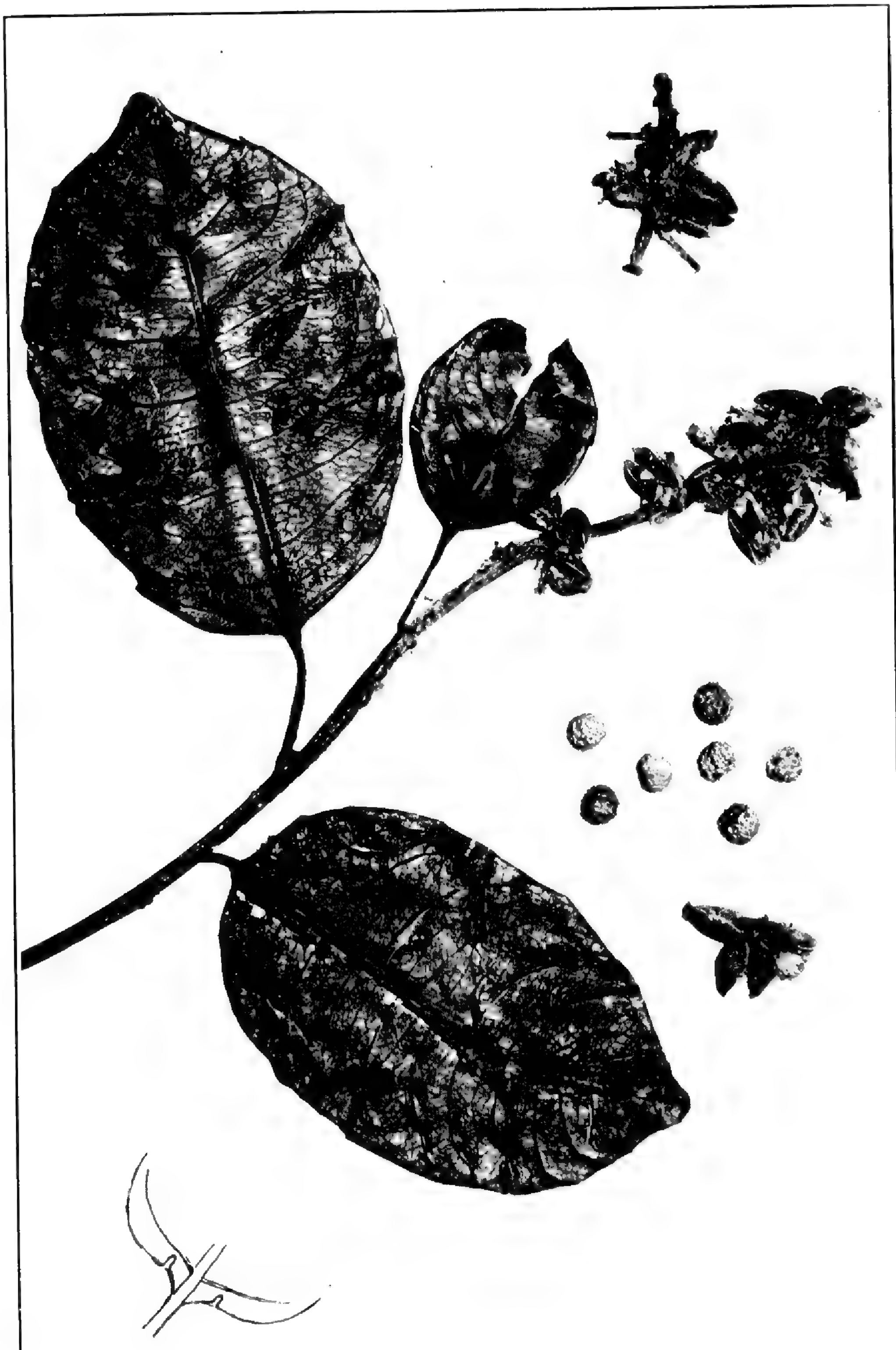
5. Sapium pedicellatum Huber, Bull. Herb. Boiss. II. **6**: 352. 1906. PLATE XIV.

A medium-sized tree with generally elongated crown, the limbs ascending; petioles 8 to 18 mm. long, the glands elongate, cylindrical; leaf blades membranaceous and tender on the young floral shoots, coriaceous later, almost uniformly elliptic-lanceolate, 4 to 9 cm. long, 1.5 to 3 cm. broad, more or less acute at base and pointed at the glandless tip; the margin smooth in young leaves, distinctly serrulate in the mature ones; the secondary nerves numerous, more or less prominent on the upper face according to the age of leaf; floral branchlets slender and not ramified, growing profusely on the thick, succulent twigs of the preceding year; floral spikes lateral or terminal, androgynous or only staminate, probably in part caducous, 7 to 9 cm. long; floral glands oval; staminate flowers generally 5 in each cluster, the bracts broad and very short, the perianth divisions acute, the stamens connate only at base, their filaments thickened at the middle, the anthers cordate; pistillate flowers, when present, 1 to 4 at base of each spike; ovary distinctly stipitate and shortly mucro-



SAPIUM THELOCARPUM SCHUMANN & PITTIER.

SAPIUM PEDICELLATUM HUBER.



SAPIUM PITTIERI HUBER.

nate; capsules slightly rugose outside, ligneous, dehiscent, rather large, the pedicels 6 to 8 mm. long; seeds ovoid, 5 to 6 mm. long, 4.5 mm. thick, finely tuberculate, carinate at the end, this marked in the middle by a spiny tip.

Mexico: Colima, altitude about 500 meters, Dr. E. Palmer, no. 92, July, 1897. (Econ. Herb. U. S. Department of Agriculture; U. S. National Herbarium, no. 305158.)

The salient character of this species seems to be its extreme variability, making it difficult to give a very accurate description. Still, the rather long pedicels of the mature capsules and the form of the seed are pretty constant and constitute a sharply defined departure from the other Central American species. The seed characters appear again, with more or less variation, in *S. mexicanum* and in the only species known from Guatemala, the close affinity of these forms being thus made evident.

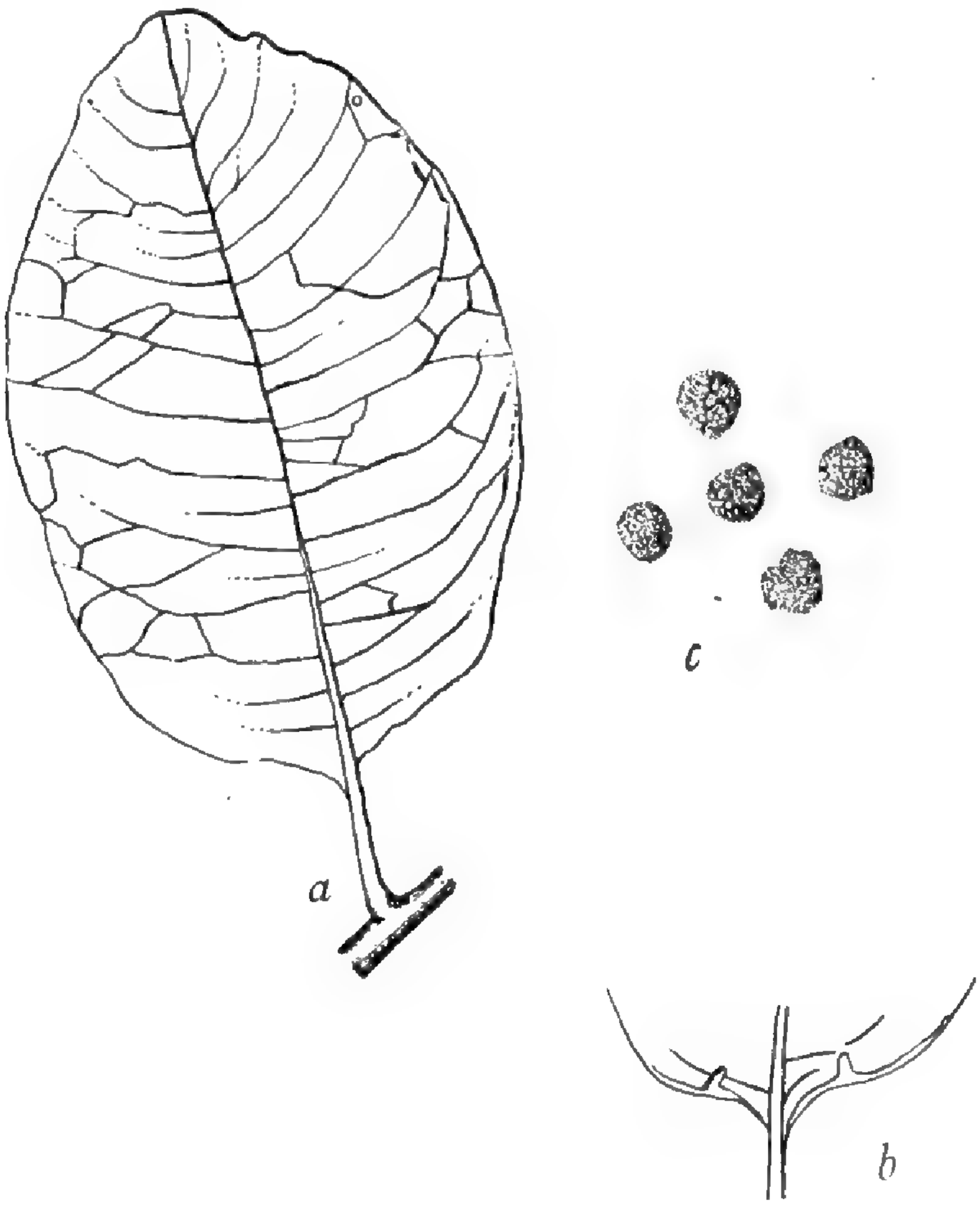


FIG. 9.—*Sapium pittieri* *a*, Leaf; *b*, leaf base, showing glands; *c*, seeds.

In Hemsley's description of *S. lateriflorum* several particulars are mentioned that can be found also in specimens of *S. pedicellatum*, as the thick floriferous branchlets with thick pith, the lateral spikes with leafy peduncles, etc. But the former species decidedly differs by the striking size of its leaves and its axillary spikes.

6. Sapium pittieri Huber, Bull. Herb. Boiss. II. **6**:350. 1906.

PLATE XV. FIGURE 9.

Tree 6 to 8 meters high, with yellowish gray branchlets; petioles about 1.5 cm. long, canaliculate, the glands on the margin of the base of the lamina; leaf blades 5 to 7 cm. long, 4 to 5 cm. broad, subcoriaceous, broadly elliptic, abruptly contracted at base, shortly but broadly acuminate with a slightly inflexed acumen; margin revolute, entire; secondary nerves moderately distant, prominent on the upper face; spikes terminal; capsules subsessile, or with very short (1 mm. long) pedicels, mucronate,

3-celled, smooth and crustaceous, its polar axis apparently longer than or nearly equal to the equatorial diameter; seeds lenticular, 3.7 mm. thick, 5.1 mm. in diameter, white; tubercles disposed on upper surface of seed in prominent, concentric lines.

Costa Rica: Western slope of La Carpintera, between Tres Rios and Cartago, at an altitude of about 1,700 meters, H. Pittier and A. Tonduz, May 2, 1891, fruit (Inst. fís.-geog. Costa Rica, no. 4344).

Professor Schumann (in schedula) called this species *S. pycnostachys*, and it is unfortunate that this name can not be retained, as it referred to the thick-set appearance of the fructiferous spike. The species is closely allied to *S. oligoneurum* and *S. anadenum* and consequently to *S. aereum* and its South American associates; it differs from the first two by the peculiar disposition of the petiolar glands, and from *S. anadenum* in particular by its subsessile, longer capsule, the outer shell of which is also thinner and smoother.

7. Sapium pachystachys Schumann & Pittier, sp. nov. PLATE XVI.

Small tree with thick, short trunk, 40 cm. in diameter, and more or less depressed crown, the primary limbs mostly horizontal; stipules ovate-lanceolate, acuminate; petioles thick, sulcate, 1 to 2 cm. long; petiolar glands rather short and thick, contiguous with the blade; leaf blades 8 to 9 cm. long, 4 to 5 cm. broad, coriaceous, oval-elliptic, rounded at base and with obtuse acumen, paler below; margin revolute; secondary nerves arcuate, prominent on both faces; floral spikes terminal, single, androgynous, thick; floral glands elliptic, 2 at base of each pistillate flower and at base of each group of staminate flowers, the latter in clusters of 3 to 5; stamens half-included in calyx; filaments thick and short; anthers as broad as long; pistillate flowers 8 to 10 at base of spikes, each flower with ovate-acuminate scales 3 to 3.5 mm. long and 4 mm. broad, their margins membranous and transparent; calyx tubiform, yellowish white, enveloping the ovary and style as far as the forking of the stigmas; ovary slightly depressed, 2.5 mm. in diameter, 1.5 mm. high, distinctly pedicellate; style 2 mm. long; stigmas thick, rather long (about 3 mm.), nearly straight, spreading; capsule and seed unknown.

Costa Rica: Small tree growing isolated in pastures at El Copey, Dota Mountains, altitude 1,800 meters, A. Tonduz, February, 1898, flowers (Inst. fís.-geog. Costa Rica, no. 11875; U. S. National Herbarium no. 333961, type).

8. Sapium oligoneurum Schumann & Pittier, sp. nov. PLATE XVII.

A tree about 12 meters high, with elongated crown and slender habit; petioles thin, 1 to 2 cm. long; petiolar glands rather long and cylindrical, inserted at the beginning of the expansion of the lamina; leaf blades 3 to 7 cm. long, 2 to 3 cm. broad, ovate to ovate-elliptic, the base shortly cuneate, then rounded, the apical gland well developed on a narrow involute acumen, the margin sinuate, obscurely crenate, the nerves few; spikes often as much as 14 cm. long, single, terminal with a few pistillate flowers at base; floral glands elliptic-elongate; staminate flowers in clusters of 5 to 7, one of them opening at a time; bracts broad and short, with rounded scarious upper margin; perianth broadly open; filaments slender; anthers small.

Costa Rica: Along upper road going from the railroad station at Cartago to Cot, near San Rafael, altitude 1,500 meters, H. Pittier, July, 1899 (Inst. fís.-geog. Costa Rica, no. 13403; U. S. National Herbarium, no. 578903, type).

This species is maintained, subject to revision when better information is secured, on the authority of Schumann, notwithstanding the deficient material at hand. The form of the leaves, if not their reduced size, and the apical gland suggest *S. aereum* Klotzsch, but for the metallic sheen, which seems to be a constant character of the leaves in the latter species. Also, the wide distance between the reported stations is opposed to the identity of the two species, the known forms having almost always very limited ranges.

SAPIUM PACHYSTACHYS SCHUMANN & PITTIER.

SAPIUM OLIGONEURUM SCHUMANN & PITTIER.

9. Sapium sulciferum Pittier, sp. nov. FIGURE 10.

A medium-sized tree with flattened crown; branchlets grayish, longitudinally striate; stipules small, ovate; petioles 1 to 2 cm. long, and rather slender; petiolar glands small, roundish, at the attenuate base of the blade; leaf blades 5 to 8 cm. long, 2.5 to 4 cm. broad, coriaceous, paler on the lower side, oval-elliptic, shortly attenuate, ending in an obtusely angular tip, the margin obscurely sinuate; spikes androgynous, lateral or in clusters (generally 4) at the ends of limbs; floral glands deciduous; pistillate flowers numerous (16), part remaining undeveloped; staminate part of spike caducous, the fructiferous part 5 to 8 cm. long; capsules 9 to 10 mm. in diameter, 7 to 8 mm. high, coriaceous, distinctly pedicellate, depressed, ending with the terete base of the style; seeds lenticular, 3.5 mm. thick, 5 mm. in diameter, tuberculate, reddish brown.

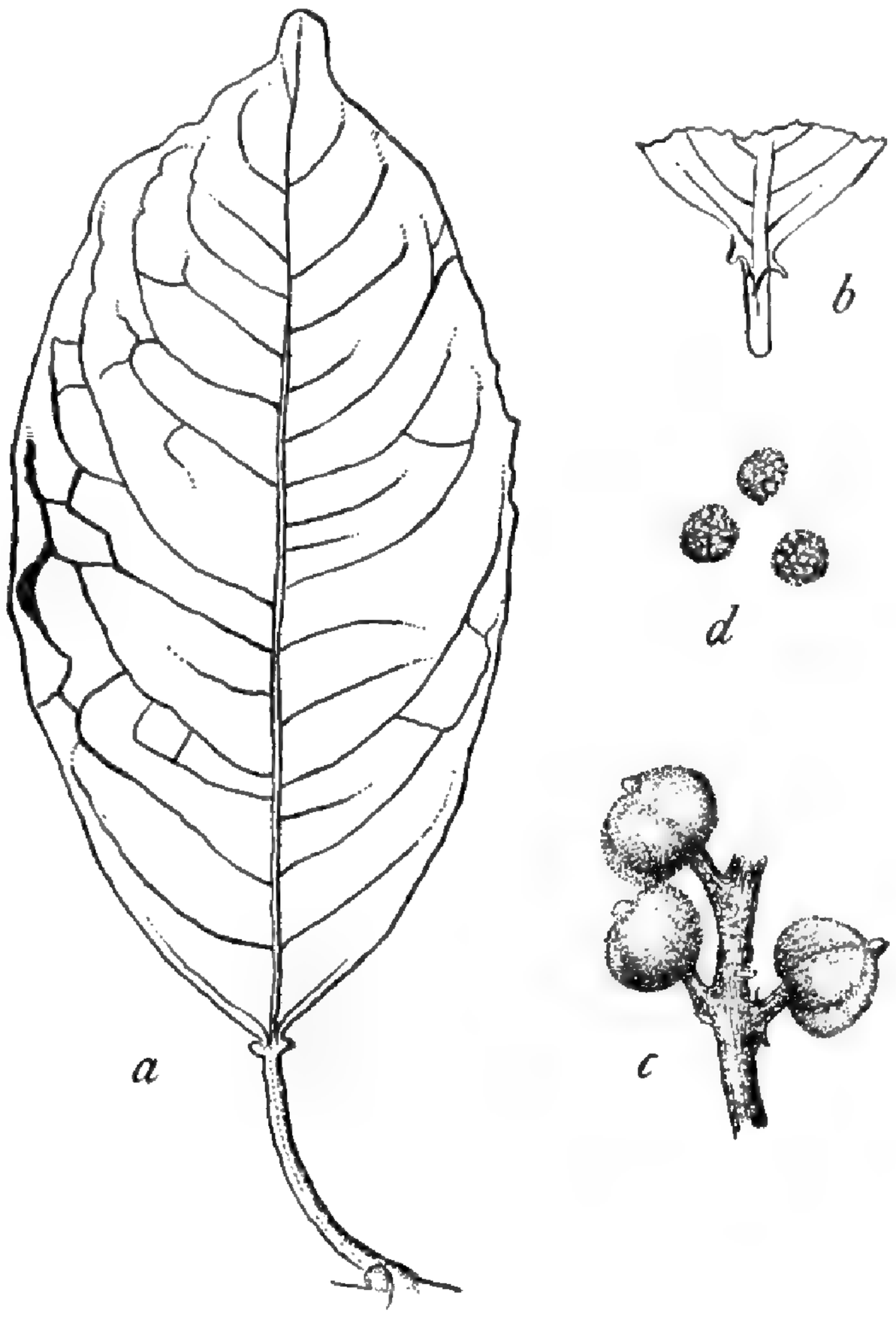


FIG. 10.—*Sapium sulciferum*. *a*, Leaf; *b*, leaf base, showing glands; *c*, fruits; *d*, seeds.

Costa Rica, along the main road at La Palma, in the zone of perennial rainfall, altitude 1,500 meters, A. Tonduz, August 15, 1898, fruit (Inst. fís.-geog. Costa Rica, no. 12428; U. S. National Herbarium, no. 577588, type).

This number is cited by Hemsley[a] as near to *S. aereum* Klotzsch, from Peru, "but the leaves want the metallic sheen, the persistent base of the styles is terete, and the brown seeds are only about half as large as those of *S. aereum*." Moreover, the leaves are smaller and their apical glands less developed, the union of the petiole and the lamina forms a small, infundibuliform groove, on the margins of which the petiolar glands stand, and the capsules are smaller with a shorter polar axis.

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[a] Hook. Ic. Pl. IV. **27**: under *pl. 2682*.

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CONTRIBUTIONS

FROM THE

UNITED STATES NATIONAL HERBARIUM

VOLUME XII, PART 5

NEW OR NOTEWORTHY PLANTS FROM COLOMBIA AND CENTRAL AMERICA

By HENRY PITTIER

WASHINGTON
GOVERNMENT PRINTING OFFICE
1909

BULLETIN OF THE UNITED STATES NATIONAL MUSEUM.

Issued January 22, 1909

PREFACE.

The accompanying paper by Mr. Henry Pittier, of the United States Department of Agriculture, contains descriptions of some new species and other noteworthy plants, selected from several collections which have recently come into the possession of the United States National Museum. These collections form a most valuable addition to the herbarium, and their richness in new and rare species emphasizes the need of still further field work in tropical America and the more extensive study of the plants already collected.

J. N. Rose,
Acting Curator.

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NEW OR NOTEWORTHY PLANTS FROM COLOMBIA AND CENTRAL AMERICA.

By Henry Pittier.

The present paper includes descriptions of a few plants from collections made mainly in the course of my explorations in Costa Rica from 1887 to 1903, and of others obtained more recently in Guatemala and Colombia in connection with investigations conducted on behalf of the United States Department of Agriculture.

The two species from Colombia, *Roupala ferruginea* and *Phyllanthus salviaefolius*, are old, but have remained little known; additional specimens permit several interesting facts to be added to the original descriptions by Kunth. The discovery in Costa Rica of two new species of Phyllonoma bridges a gap in the geographical distribution of a genus which has hitherto appeared widely interrupted, as its previously known members came from Peru and Colombia on the one side and from central Mexico on the other. The three Costa Rican species of Carpotroche show the extension toward the west and north of a genus thus far considered almost exclusively Brazilian. The remaining species, besides being new, have several interesting features which are noted in connection with the descriptions. I am greatly indebted to Dr. Th. Loesener, of the Berlin Royal Herbarium, for his help in the identification of *Myginda eucymosa*.

Roupala ferruginea H. B. K. Nov. Gen. & Sp. **2:** 153. *pl. 120.* 1817.

A small tree, with alternate limbs, the younger branchlets, petioles, main and secondary veins, peduncles and pedicels ferruginose-tomentose.

Leaves alternate, petiolate; petioles rather thick, 1 cm. long; leaf-blade firm, rounded at base, ovate, more or less acute, pale green and subglabrous above, brownish white and delicately reticulate-venose beneath.

Racemes axillary, pedicellate, the pedicels 3 mm. long, adnate at base. Perianth 7 to 8 mm. long, glabrous outside, longitudinally striate. Stamens glabrous: filaments 5 mm. long, flattened, adhering to sepals; anthers ovate-elliptic, about 2 mm. long; end of connective rounded, scarcely surpassing the anthers. Pollen grains about 0.027 mm. in diameter, tetrahedral with a round nucleus. Glandular appendages at base of pistil glabrous, square at tip; pistil 7 mm. long; ovary ovate, hairy; style claviform.

Colombia: Loma Gorda near Jambaló, Department of Cauca, at an altitude of 2.400 meters, H Pittier, no. 1451, flowers February 5, 1906 (U. S. National Herbarium no. 531649).

The leaves of these specimens are uniformly rounded at the base and ovate and more or less acute at the tip, while those of the type are described as "obovato-oblongis basi angustatis." Moreover the racemes appear to be single and not geminate. But these small differences would not, apparently, justify the separation of the Jambaló form as a new species.

Phyllonoma tenuidens Pittier, sp. nov. FIGURE 11.

A bushy tree, 2 to 3 meters high, with erect, glabrous limbs and branchlets. Older branchlets longitudinally striped with brownish white, irregular bands apparently due to the splitting of the dark brown bark.

Foliage very dense. Leaves alternate, exstipulate, glabrous: petioles canaliculate, slender, 7 to 10 mm. long. Leaf blades 5 to 7 cm. long, 2 to 3 cm. broad, elliptic, cuneate, long-acuminate, rather thin, discolorous: primary vein prominent underneath, the secondary ones very slender, regular, minutely anastomosing, apparent on both faces; margin revolute, serrate from near the base by numerous regular and very slender teeth.

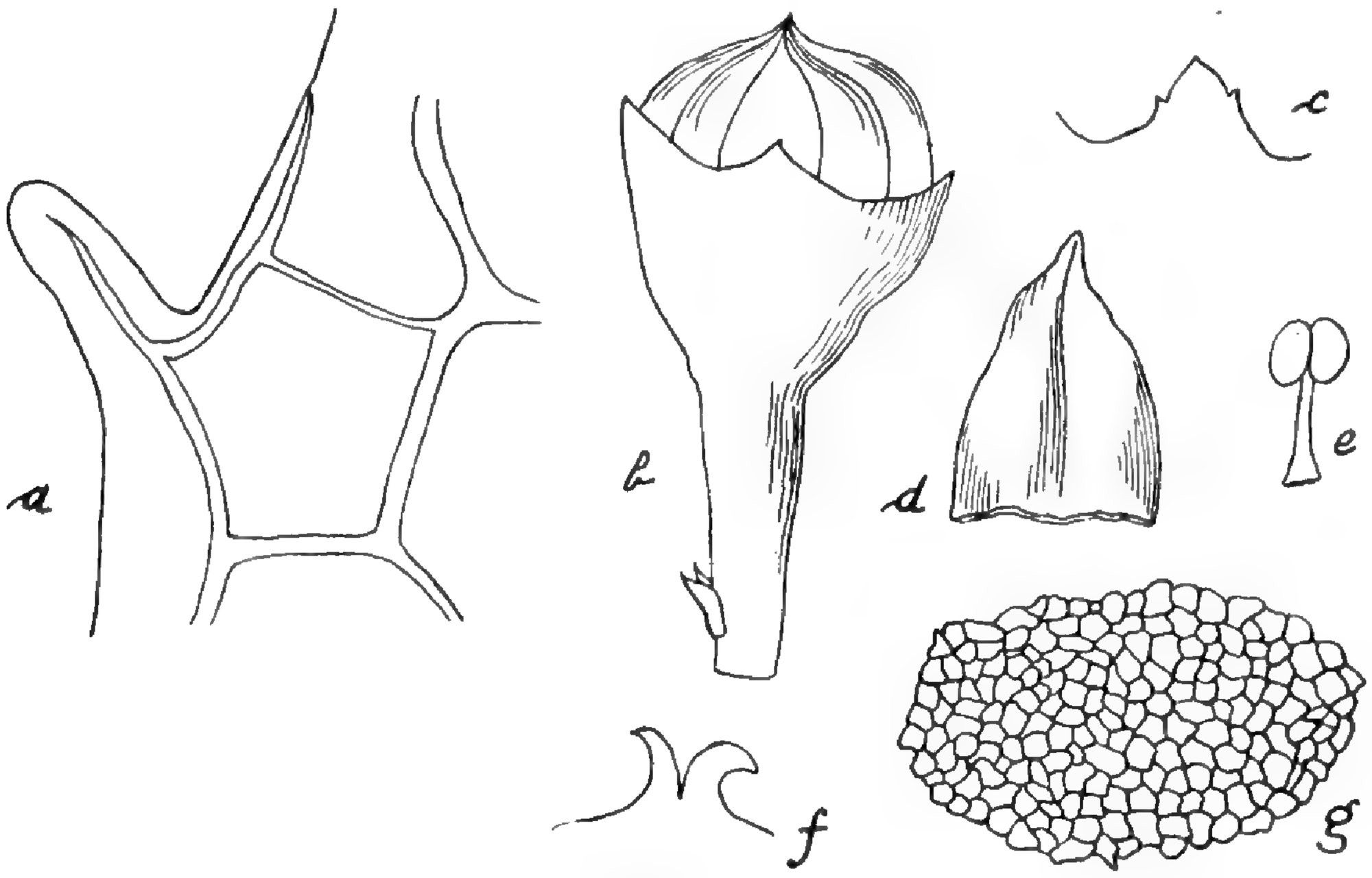

FIG. 11.—Flower parts and tooth of leaf of *Phyllonoma tenuidens*. *a*, Segment of leaf with tooth; *b*, floral bud; *c*, lobe of calyx; *d*, petal; *e*, stamen; *f*, style; *g*, seed. *a*, Natural size; *b*–*g*, scale 18.

Inflorescence inserted on the blade, 1 cm. or more from the base of the acumen, cymose, and generally formed of 2 clusters of 4 flowers each on very short, squamose peduncles. Bracts at base of pedicels broadly ovate and subulate. Pedicels of mature flowers pubescent, seldom over 1.4 mm. long. Prefloration valvate.

Flowers very small. Sepals glabrous, broadly triangular, about 0.5 mm. long, with one minute tooth on each side. Petals 1.4 mm. long, 1 mm. broad, lanceolate-acuminate, yellow. Stamens 1 to 1.2 mm. long, filaments broader at base; cells of the anthers ovate, full. Hornlike styles about 0.5 mm. long.

Usually a single, small, pedicellate berry at each inflorescence, the diameter about 4.5 mm., the length 5.5 mm. Seeds usually 5 in each berry, ovate or ovate-elongate, about 1.5 to 2 mm. long, reddish brown, densely covered with conical tubercles.

COSTA RICA: Cuesta de los Borucas, on the mountain road leading from San Marcos de Dota to the Diquis Valley, altitude 2,900 meters; H. Pittier, flowers and fruit, January, 1897 (Instituto fís.-geog. Costa Rica, no. 10552; type U. S. National Herbarium no. 578896).

Phyllonoma triflora Pittier, sp. nov. FIGURE 12.

A bushy shrub or small tree, 2 to 3 meters high. Branchlets ascending, flexuous, glabrous.

Leaves numerous, alternate, exstipulate, glabrous. Petioles 7 to 8 mm. long, canaliculate, decurrent in two narrow wings; leaf blades 6 to 7 cm. long, 2 to 2.5 cm. broad, elliptic, acute at base, long-acuminate, coriaceous, yellowish green above, pale green beneath; primary vein apparent as a dark line above, very prominent beneath; secondary veins anastomosing along the margin, and connected by numerous transverse, ramified venules, forming a prominent network on the upper face of the leaf, but scarcely visible underneath; margins subrevolute, entire for the first third of their length, with acute, distant teeth on the upper two-thirds, these usually 4 on one side and 5 on the other side.

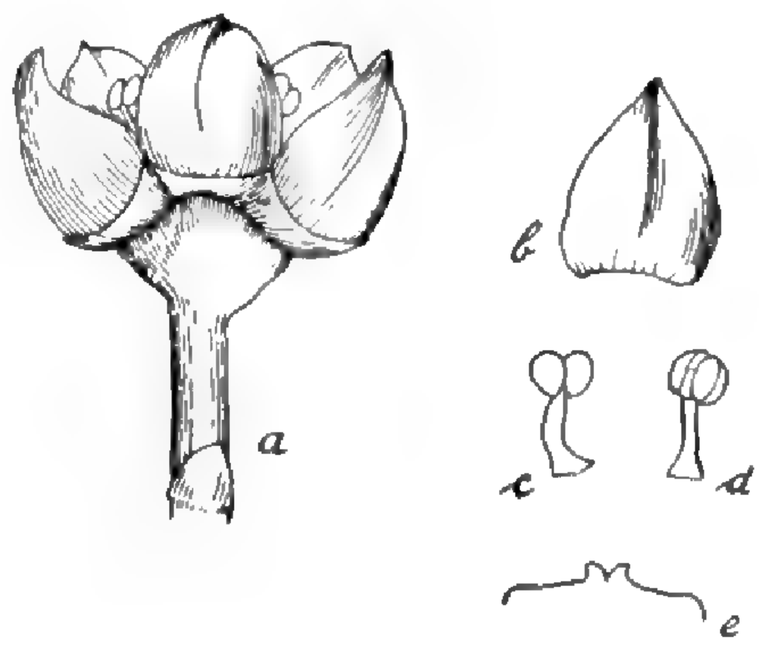

FIG. 12.—Flower and flower parts of *Phyllonoma triflora*. *a*, Open flower; *b*, petal; *c*, *d*, stamens; *e*, style and upper section of disk. *a*–*e*, Scale 18.

Inflorescence in sessile clusters of 3 flowers each on the midvein of the blade, at about two-thirds of the total length of the leaf from the base of the petiole.

Flowers pedicellate, very small, greenish yellow, opening in succession. Pedicels about 2 mm. long, gradually thickening toward the upper end, glabrous, with a small rounded bract at base of each. Lobes of calyx short, broadly triangular, acute. Petals 1.5 mm. broad at base, ovate-triangular with rounded tips. Stamens short, glabrous, inflected on the disk before anthesis, hanging between the petals later; filaments subulate; anthers broadly ovate-cordate, basifix. Disk large, yellow, covering the ovary and concrescent with it. Ovary inferior, two-celled (?); style none; stigmas 2, short, emerging from the disk. Ovules ventrifix, 3 or 4 in each cell.

Berry globose, fleshy, shortly pedicellate, showing at the top the 5 teeth of the concrescent calyx and the two stigmas. Seeds 3 to 6, subreniform, with a coarse, brown aril, about 2.5 mm. long.

COSTA RICA: La Palma, in the Central Cordillera, altitude 1,500 meters, H. Pittier, flowers and fruits, October, 1902 (Instituto fís.-geog. Costa Rica no. 16553; type U. S. National Herbarium no. 578054).

The type of the genus is *Phyllonoma ruscifolia* Willd., a species from Peru, elaborately described and figured by Kunth[a] under the name of *Dulongia acuminata*. In 1858, Turczaninow published two species; one, collected by Galeotti (no. 7197) in the forests of Oaxaca, Mexico, at an altitude of 1,700 to 2,000 meters, he named *Dulongia laticuspis;* the other, a native of the mountains of Pamplona in the Colombian Department of Santander, whence it was brought by Funk and Schlim (no. 1657), is his *D. integerrima*.

The first species differs from the type mainly by the indentation of the margin, which begins near the base, instead of being limited to the upper third, and also by its acumen "articulate on the blade, and parted to the main nerve." In the U. S. National Herbarium there is a species brought from around Teponapa, in the mountains near Pápalo (State of Oaxaca, Mexico), where it grows at an altitude of 500 meters above sea level (collected by Gonzalez and Conzatti, no. 764), that agrees with Turczaninow's description as to the indentation of the leaf, but does not show any distinctive character in its long and acutely pointed tips. It differs also from *P. ruscifolia* in having the inflorescences affixed at the base of the acumen, and not on the blade proper; the marginal teeth, moreover, instead of being broad and short, as shown in the H. B. K. plate, are narrow and finely mucronate. In all probability these specimens correspond to *Dulongia laticuspis* Turcz.

[a] In H. B. K. Nov. Gen. & Sp. 7: 76. *pl. 623*. 1825.

Dulongia integerrima Turcz. differs from Willdnenow's species by its leaves being perfectly entire, twice as large, and one-half as broad as in that species; the stigmas, also, are said to be supported by very short styles. Dr. Britton referred to this species Rusby's no. 2521 collected at Mapirí, Bolivia. In the specimen of this collection at hand almost every leaf bears a few irregularly placed teeth: they are larger, but never twice as large, and decidedly not one-half broader (if a little so), as in *D. laticuspis*. In the only flower that was available for study, there were 3 stigmas, this being without doubt an anomaly, but they were just as sessile as in *D. acuminata* and *D. laticuspis*. Taking into consideration, also, the wide distance that separates the two localities where the specimens were collected, I feel inclined to consider Rusby's plant a distinct species; but I must refrain from describing it as such, on account of the insufficiency of material at hand.

Following the law of priority, the name Dulongia was dropped and Phyllonoma maintained by Bentham and Hooker. Also the genus was transferred from the Celastraceae, where it had been placed by Kunth, to the Saxifragaceae, to which it belongs by a majority of its structural characters.

Dr. Engler[a] admits only two species, viz, *P. ruscifolia* Willd., of New Granada (Colombia), which he characterizes by its entire leaves and longer pedicellate flowers, and *P. laticuspis* (Turcz.) Engler with serrate leaves and short-pedicellate flowers, from the high mountains of Mexico. This evidently leaves out the species of the Nova Genera et Species, minutely described by Kunth, apparently from the same specimens as those on which Willdenow established his species. Should this view be maintained, there would now be the following species: *P. ruscifolia* Willd.=*P.* (*Dulongia*) *integerrima* Turcz., with entire leaves; *P. laticuspis* (Turcz.) Engler, serrate on almost the whole margin of the leaf; *P.* (*Dulongia*) *acuminata* H. B. K., serrate on the upper half of the leaf only; Rusby's species with subentire leaves; and lastly the two Costa Rican species here described, that differ from all the others more than these among themselves. On account of the scarcity of material in the European and American collections, the true status of the doubtful forms can scarcely be determined at present.

Phyllanthus salviaefolius H. B. K. Nov. Gen. & Sp. **2**: 117. *pl. 107. 108.* 1817.

Phyllanthus floribundus H. B. K., loc. cit.

Kirganelia salviaefolia Spreng. Syst. **3**: 48. 1828.

Oxalistylis kunthiana Baill. Étud. Gen. Euphorb. 629. *pl. 24. fig. 15–19.* 1858.

A small tree about 3 meters high, with numerous, alternate, tortuose, almost horizontal limbs and a depressed crown. Pseudo-branchlets 15 to 25 cm. long, caducous, obscurely 4-angled, covered, like the ends of the permanent branches, with dense, furfuraceous, brownish hairs, and provided at the base with 3 ovate, acute, stipule-like scales.

Leaves alternate or distichous, petiolate, with narrow, pointed stipules, 6 to 7 mm. long; petioles short (4 to 5 mm.), hairy; leaf blades 4 to 8 cm. long, 2 to 3 cm. broad, ovate-oblong, rounded or subcordate at base, narrowing gradually to an acute tip, densely furfuraceous beneath, more or less smooth above except on main nerves; primary and secondary veins hirsute and very apparent on both sides, the latter regularly alternate, arcuate and parallel.

Flowers diclinous, forming short-pedunculate, compound corymbs in the axils of leaves, each secondary cluster made up of 1, 2, or more pistillate flowers, accompanied by 1 to 3 staminate flowers, all together surrounded at base of pedicels by an involucre of generally 4, lanceolate, hirsute bracts, the larger of which are about 5 mm. long.

Staminate flowers small; pedicels glabrous, 3 to 5 mm. long. Sepals 6 in two alternate circles of 3, each 1.5 mm. long, 1 mm. broad, ovate-oblong, with slightly narrower claw. Disk cupuliform, plicate; stamens 3 to 9; filaments connate at base in a cylindrical column 0.5 mm. long, then free and unequal; connective broadened; anthers bilocular, each cell opening longitudinally.

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[a] In Engl. & Prantl, Pflanzenfam. **3**[2a]: 88. 1890.

MYGINDA EUCYMOSA LOESENER & PITTIER.

Pistillate flowers larger, on glabrous pedicels 25 to 35 mm. long, these capillary, but thickening slightly just below the flower. Perianth 6-partite, reddish or purplish, glabrous, with ovate divisions about 5 mm. long, rounded at tip and each marked with 3 dark, branched veins. Disk cupuliform, rather broad, obscurely 6-lobate. Pistil glabrous, 5 to 6 mm. long; ovary subglobose, 3-locular, and surmounted by a style first forming a short (about 1.5 mm.) column, and then dividing into generally 3 or sometimes only 2, or again very rarely 4 branches, each ending in a subflabellate, crenate-lobate, deep purple stigma.

"Capsule of the size of a pea, 3-coccous, depressed-globose, 6-sulcate, smooth, brownish, inclosed in the persistent, subequal perianth and crowned by the style; cells 2-spermous. Seeds triangulate, longitudinally striate, glabrous, brownish."[a]

Bitoncó, in Moras Valley, in the Central Cordillera of Colombia, at an altitude of 2,500 m. above sea level, H. Pittier, no. 1322, flowers, February 3, 1906 (U. S. National Herbarium nos. 531520 and 531521). It grows in clusters around houses and if not semicultivated is at least tolerated on account of its uses.

General distribution, Andes of Ecuador, Colombia, and Venezuela.

Local names, *teñidero;* Paez language, *šal.*

Although this interesting species has been thoroughly described by several authors besides the original, I venture here to give a new description based on the specimens mentioned above, except for the characters of the seeds, which I have not seen.

This plant, along with the several species of Castilla, belongs to that imperfectly known series of tropical trees which, besides the usual ramification, bear other appendages that come midway between a branchlet and a leaf, and that may be called either pseudo-branchlets or pseudo-leaves. As a matter of fact they are more like compound leaves, and in *Phyllanthus salviaefolius* they even show at their base stipule-like scales; to make the likeness greater it may be added that they are shed once a year, like the true leaves in deciduous trees. But on the other hand, their insertion on the limbs of the tree seems to be more like the insertion of a true branchlet, and in the axils of their leaflets they bear the inflorescences, thus playing the rôle of true branchlets. This peculiarity seems to have been first observed on the Castilloa of the Isthmus of Panama, by Robert Cross, who claims to have noticed the same phenomenon on several other tropical trees. It would be interesting to make a list of these and on that account the attention of future collectors is called to that striking feature of tropical vegetation.

As the styles are usually trifid, only occasionally bifid, and very seldom quadrifid, *Phyllanthus salviaefolius* should perhaps not come under Series II, but under Series I, in the systematic arrangement as given by Pax in the Pflanzenfamilien.[b] Moreover, the dehiscence of the anther cells is not transverse, but clearly longitudinal, as already stated by Bonpland and Kunth.

The Paez Indians, in the mountainous valleys surrounding the Páramo de Moras, in the Central Cordillera of Colombia, use the decoction of the leaves to dye the wool of their sheep, which they use for their clothing. The black color thus obtained is said to be firm and lasting.

Myginda eucymosa Loesener & Pittier, sp. nov. PLATE XVIII.

A small tree 2 to 5 meters high, with dichotomous, erect ramification. Flowering branchlets slender, flattened at the ends, glabrous.

Leaves petiolate, glabrous, opposite, each pair set at right angles with the adjoining pairs. Petioles about 5 mm. long, canaliculate. Leaf blades 4.5 to 7.5 cm. long, 2 to 4 cm. broad, elliptic-ovate to ovate-oblong, broadly cuneate, acuminate, dark green above, paler beneath; main and secondary veins slightly prominent on lower face; margin obscurely revolute, obsoletely serrulate with very minute, caducous, appressed, nigrescent teeth.

Inflorescence distinctly cymose and profusely ramified, solitary, axillary, and not quite as long as the leaves or much shorter. Bracts narrow and acute, opposite,

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[a] H. B. K., loc. cit.

[b] Engl. & Prantl, Planzenfam. **3**[5]: 18–23. 1890.

minutely hairy when seen with a strong glass, each ending in a callose tooth, very small, deep orange-red at tip. Peduncles and pedicels also minutely hairy; main peduncles 2 to 3.5 cm. long, floral pedicels 1 to 1.5 mm. long.

Flowers numerous, tetramerous, of a yellow-green color. Sepals distinct in two opposite pairs, orbicular, 1 mm. long, hairy outside. Petals obovate, 2 to 2.5 mm. long, 1.6 mm. broad, attenuate into a short claw. Disk cupuliform, thick, divided into 4 segments. Stamens 1 mm. long, alternate with the segments of the disk; filaments slender, erect; anthers subreniform, of a deep orange-red color. Pistil glabrous; ovary semiinferior, globose, 2-celled, the cells 1-ovulate; style 0.4 mm. long, dividing at tip into 2 flat, rounded stigmas.

GUATEMALA: Department of Alta Verapaz, along the Cahabon River between Chimaxte and Cajval, altitude 200 meters, H. Pittier, no. 239, flowers, May 4, 1905 (U. S. National Herbarium no. 472895, type); on the hills around Secanquim, altitude 550 meters, H. Pittier, no. 301, flowers, May 9, 1905 (U. S. National Herbarium no. 472964).

This new species is intermediate between *M. uragoga* Jacq. and *M. gaumeri* Loesener. It is somewhat like the first in habit, but differs obviously from it by being almost entirely glabrous and in having larger leaves and more developed inflorescences. From *M. gaumeri* it is easily distinguished by its elongate, smooth branchlets, obovate petals, and bifid style.

EXPLANATION of PLATE XVIII.—*a*, Flowering branchlet; *b*, cyme; *c*, bract; *d*, tip of same enlarged to show terminal gland; *e*, petal; *f*, stamens; *g*, ovary and disk. *a*, Scale ½; *b*, *c*, *e*, *f*, scale 9; *d*, larger.

Hippocratea (Cuervea) obovata Pittier, sp. nov. FIGURE 13.

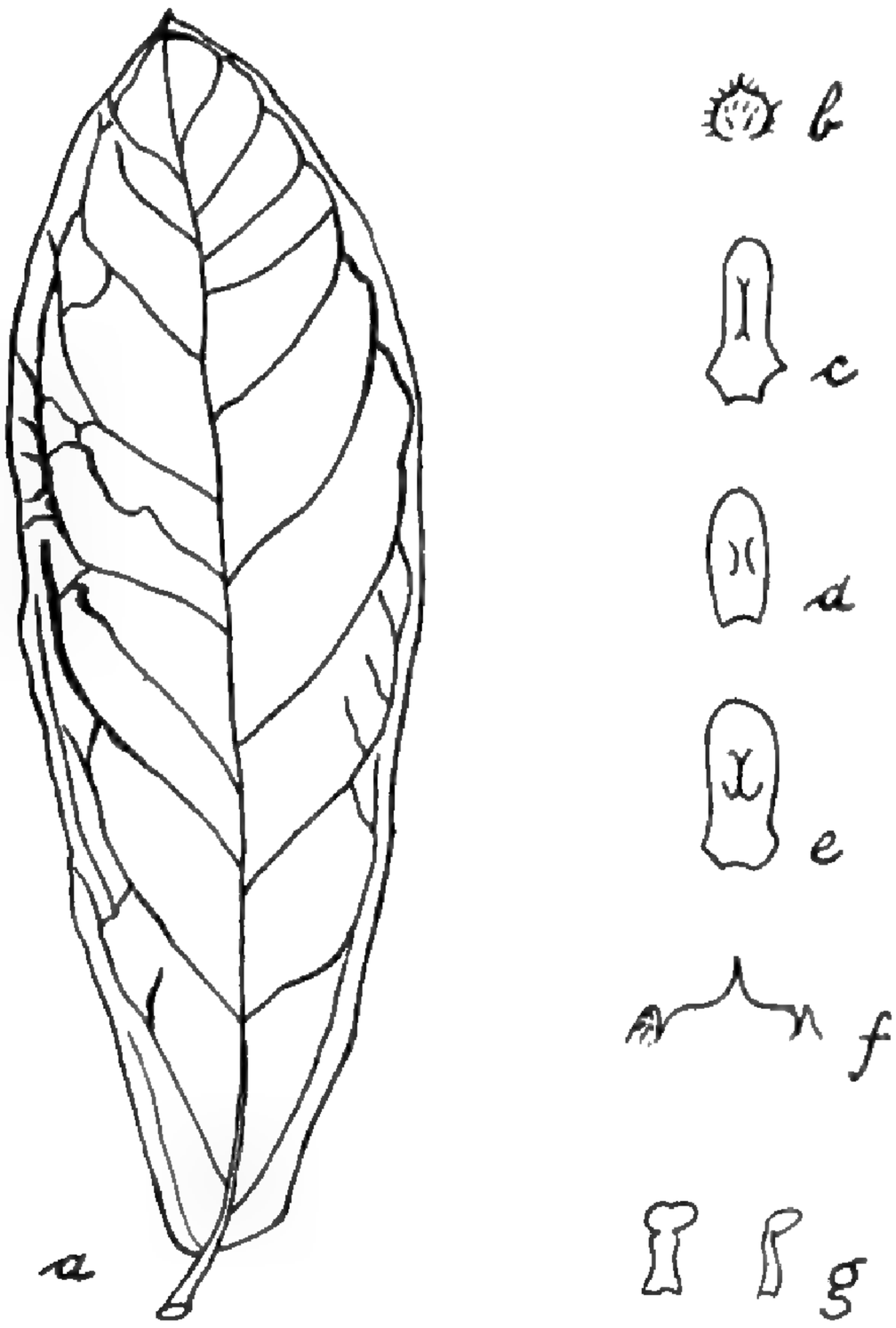

FIG. 13.—Leaf and flower parts of *Hippocratea obovata*. *a*, Leaf; *b*, sepal; *c*, *d*, *e*, forms of petal; *f*, ovary and disk; *g*, front and side view of stamen. *a*, Natural size; *b* to *g*, enlarged.

A small tree with divaricate limbs; floral branchlets opposite, short, thick, almost perpendicular to their axis.

Leaves opposite or in pairs at end of branchlets, petioles 3 to 4 mm. long, sulcate, hispidulous. Leaf blade 5 to 10 cm. long, 2 to 3 cm. broad, glabrous, discolor, i. e., light green above and pale brown beneath, obovate, or obovate-elliptic, narrow and distinctly rounded, broadly pointed; margin obscurely sinuate, secondary nerves subopposite, generally 9 pairs on each leaf, arcuate and connected near margin.

Inflorescence forming terminal dichotomous cymes with 4 to 6 main minutely hispid peduncles 15 mm. long. Pedicels short, hispid, with minute bractlets at base. Sepals 5, ovate-acuminate, 1.5 mm. long, 1.2 mm. broad, finely hispidulous or hirsute, ciliate. Petals 5, ovate-elliptic, 4 mm. long, 2.5 mm. broad, thick, carnose, pale yellow and smooth, with a gland opening in one or two longitudinal slits on the upper face; disk obscurely 5-lobed, cupuliform, carnose, about 1 mm. deep. Stamens 3, inserted inside the disk, filaments short, triangular, nearly 1 mm. broad at base and 1 to 1.2 mm. long; anthers extrorse, as broad or broader than the filaments. Ovary depressed, obscurely trilobulate; ovules not more than 6 in each cell; style very short; stigma indistinct. Fruit not known.

Costa Rica: Along roads on the peninsula of Nicoya, Tonduz, flowers, April, 1900 (Instituto fís.-geog. Costa Rica no. 13891; type U. S. National Herbarium no. 472375).

This species differs from *H. setulifera* (Miers) Hemsl., with which it was associated by Mr. Donnell Smith, in having its floral branchlets generally opposite, the leaves much narrower, and the peduncles longer, and in other minor characters.

Carpotroche Endl.

There are here to be described three new Costa Rican species of this genus, the hitherto known species of which are confined to the eastern part of tropical South America. Of the new species one (*C. platyptera*), at least, is rather common in the shady, damp forests of the Atlantic plains and lower hills of Costa Rica, and will doubtless be found also in Panama and in the zone of permanent rains in the northern part of Colombia. No reason can be assigned why these interesting trees have so long escaped the attention of botanists, unless it be the difficulty of collecting them, on account of their large, bunched leaves, all crowded toward the ends of the branchlets.

The genus Carpotroche was based by Endlicher[a] on *Mayna brasiliensis* Raddi.[b] Mayna itself is an obscure genus, incompletely defined by Aublet, and Zuccarini[c] had already stated that Raddi's plant, which he carefully described, had been wrongly included in it and should form a genus by itself, mainly differing by its winged fruits, but also by a few floral characters.

Endlicher's elaborate description of the new genus founded by him at Zuccarini's suggestion was modified by Bentham & Hooker on account of the introduction of several new species, also detached from Mayna. In 1845, Poeppig and Endlicher[d] described and figured their *C.* (*Mayna*) *longifolia* (Poepp.) Benth., the first known of the truly dicœcious species of the genus. In his revision of the genus in 1861, Bentham transferred this last species from Mayna into its right place, included the new *C. grandiflora* Spruce, but ignored *C. amazonica* Mart., the description of which was published for the first time in 1871.[e] These additions caused important changes to be made in Bentham & Hooker's[f] definition of the genus, and this was further modified, although not in its essential parts, by Warburg.[g] The further addition of the three new Costa Rican species makes it necessary to introduce again a few minor changes. The following definition including these amendments will cover every one of the 7 species at present known:

Flowers unisexual, seldom polygamous. Prefloration imbricate. Sepals 2 or 3, persistent. Petals 4 to 12, in two rows. Staminate flowers numerous, lacking even the rudiments of a pistil. Stamens hairy, inserted on a scarcely thickened torus; filaments short; anthers linear, 2-celled, free or connected at base, opening in a longitudinal slit. Pistillate flowers solitary, often larger than the staminate, lacking any rudiments of stamens. Ovary superior, 1-celled, with 4 to 8 carpels and an equal number of parietal placentas, provided outside with twice as many longitudinal wings. Styles 4 to 8, short, persistent, with scarcely capitellate stigmas. Ovules numerous, anatropous. Fruit a large coriaceous or ligneous capsule, indehiscent, ovate or rounded, provided with large, slightly undulated wings and crowned at the end with the persistent styles. Seeds numerous, irregularly obovate, immersed in a fleshy pulp that originates in the aril-like outer layer of the seed envelope, smooth

[a] Gen. 918. no. 5066. 1839.
[b] Mem. Soc. Ital. delle Sci. **18:** Fisica. 402. 1820.
[c] Abh. Münch. Akad **2:** 363. 1837–40.
[d] Nov. Gen. ac Sp. Pl. **3:** 64. *pl. 271*. 1845.
[e] Spruce; Eichler, in Mart. Fl. Bras. **13**[1]: 437. 1871.
[f] Gen. Pl. **1:** 125. 1862–67.
[g] In Engl. & Prantl, Pflanzenfam. **3**[6a]: 19. 1893.

outside, with a large chalaza, much albumen, and a straight embryo. Cotyledons foliaceous, covering each other.

Erect monœcious shrubs or trees reaching 17 meters high, with alternate, entire or serrate leaves and early deciduous stipules; the flowers odorous, of variable size, the staminate in few-flowered, axillary racemes, the pistillate almost solitary. Hairs always single.

The seven species known to-day can be distinguished by means of the following key, the imperfection of which is unadvoidable, owing to the incomplete knowledge of these plants:

KEY TO THE SPECIES.

Flowers polygamous, rather large; sepals longer than the petals; a large tree, Brazil ..... *C. brasiliensis.*
Flowers diœcious.
Staminate flowers very large, petals almost 3 times as large as the sepals. Brazil ..... *C. grandiflora.*
Staminate flowers small, petals only a little larger than the sepals.
Sepals 3 or 4. Brazil and Peru ..... *C. longifolia.*
Sepals 2.
Capsules with long (2.5 to 3.5 cm.) pedicels. Brazil .... *C. amazonica.*
Capsules with very short pedicels.
Tree entirely glabrous; leaves serrate. Costa Rica .. *C. glaucescens.*
Tree more or less pubescent, furfuraceous or hairy.
Leaves sinuate-dentate; teeth acute; wings on the capsule 8. Costa Rica ..... *C. platyptera.*
Leaves irregularly sinuate-dentate; teeth subspathulate: branchlets thick; wings on the capsule 10. Costa Rica ..... *C. crassiramea.*

Carpotroche glaucescens Pittier, sp. nov. FIGURE 14.

A small tree 1.50 meters high, with few short branchlets, densely foliate toward the end.

Leaves large, glaucous. Petioles 2 to 3 cm. long, flattened on the upper side. Leaf blades 35 to 40 cm. long, 10 to 13 cm. broad, obovate, long-cuneate and narrowly rounded at base, sharply acuminate or seldom rounded at tip; glabrous, of a glaucous green color above, and paler beneath; margin sinuate-dentate near the base, distinctly serrate toward the apex; stipules thick, 15 to 20 mm. long, acutely lanceolate, furfuraceous, caducous.

Flowers unknown.

Young fruits glaucous, 8 to 10 winged, with furfuraceous pedicels 1 cm. long, 2 persistent sepals about 12 mm. long, and 4 or 5 short styles. Seeds not known.

COSTA RICA: Grape Point, coast of Talamanca. H. Pittier, young fruit, September, 1900 (Instituto fís.-geog. Costa Rica, no. 14089; type U. S. National Herbarium, no. 577934).

Differs from *C. platyptera* by its smaller size, its glaucous appearance, the form of the stipules, the indentation of the leaf, and the apparently variable number of the placentas and styles.

Carpotroche platyptera Pittier, sp. nov. PLATE XIX. FIGURES 15, 16.

A small tree 3 to 4 meters high, with few branches. Young shoots furfuraceous.

Leaves petiolate, the young ones densely hairy on their whole surface. Petioles 4 to 5 cm. long, furfuraceous, thickening slightly from base to end. Fully developed leaf blades 35 to 49 cm. long, 10 to 14 cm. broad, obovate-elliptic, cuneate, acuminate, smooth above except on the furfuraceous main nerve, hairy underneath, the midrib

CARPOTROCHE PLATYPTERA PITTIER.

and secondary veins also furfuraceous, or velvety; margin broadly sinuate-dentate; main and secondary nerves very prominent beneath, the latter arcuate and anastomosing at the ends and connected through parallel venules. Stipules broadly triangular, furfuraceous.

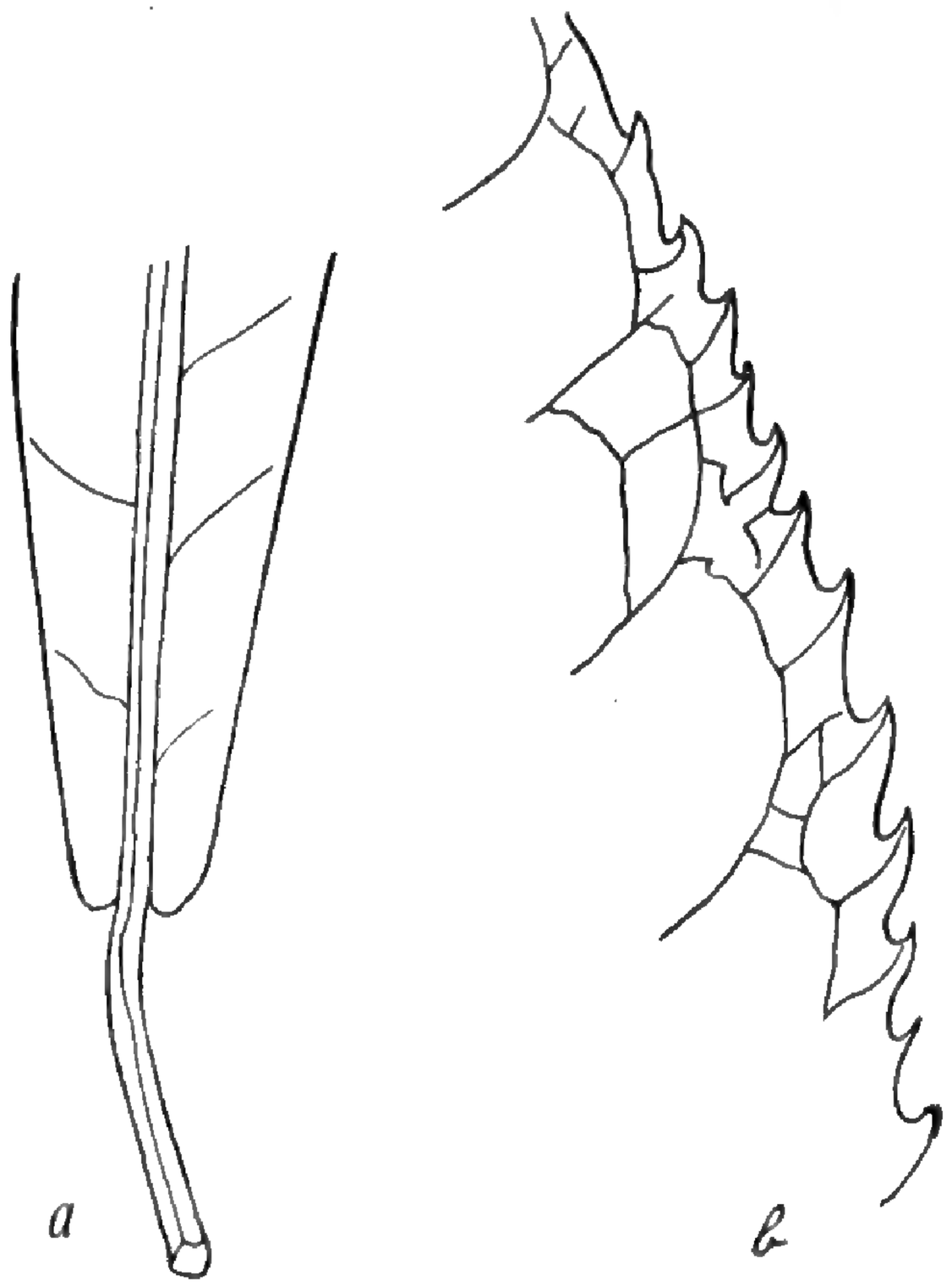

FIG. 14.—Leaf parts of *Carpotroche glaucescens*. *a*, Base; *b*, segment of margin. *a*, *b*, Natural size.

Staminate inflorescence very much reduced, the flowers appearing as if almost sessile on the trunk or in the axils of leaves. Pedicels and calyx densely furfuraceous.

Staminate flowers rather numerous, small (about 12 mm. in diameter); sepals 2, ovate-conchiform, smooth inside, furfuraceous outside except on the margin covered in prefloration, persistent, 3.4 mm. long. Petals 4 or more, 4.5 mm. long, the exterior ones broadly ovate, the interior narrower, elliptic, both hairy outside and inside in the middle, a narrow marginal strip being entirely glabrous. Stamens numerous (15 to 19), erect, apparently free, about 3 mm. long, filaments very short, free; anthers elliptic-linear, 2.5 mm. long, the cells opening first by a terminal pore, which widens later to a longitudinal slit.

Pistillate flowers large, about 30 mm. in diameter, few and single in the axils of leaves. Sepals as in staminate flower but larger in proportion. Petals 8, elliptic-

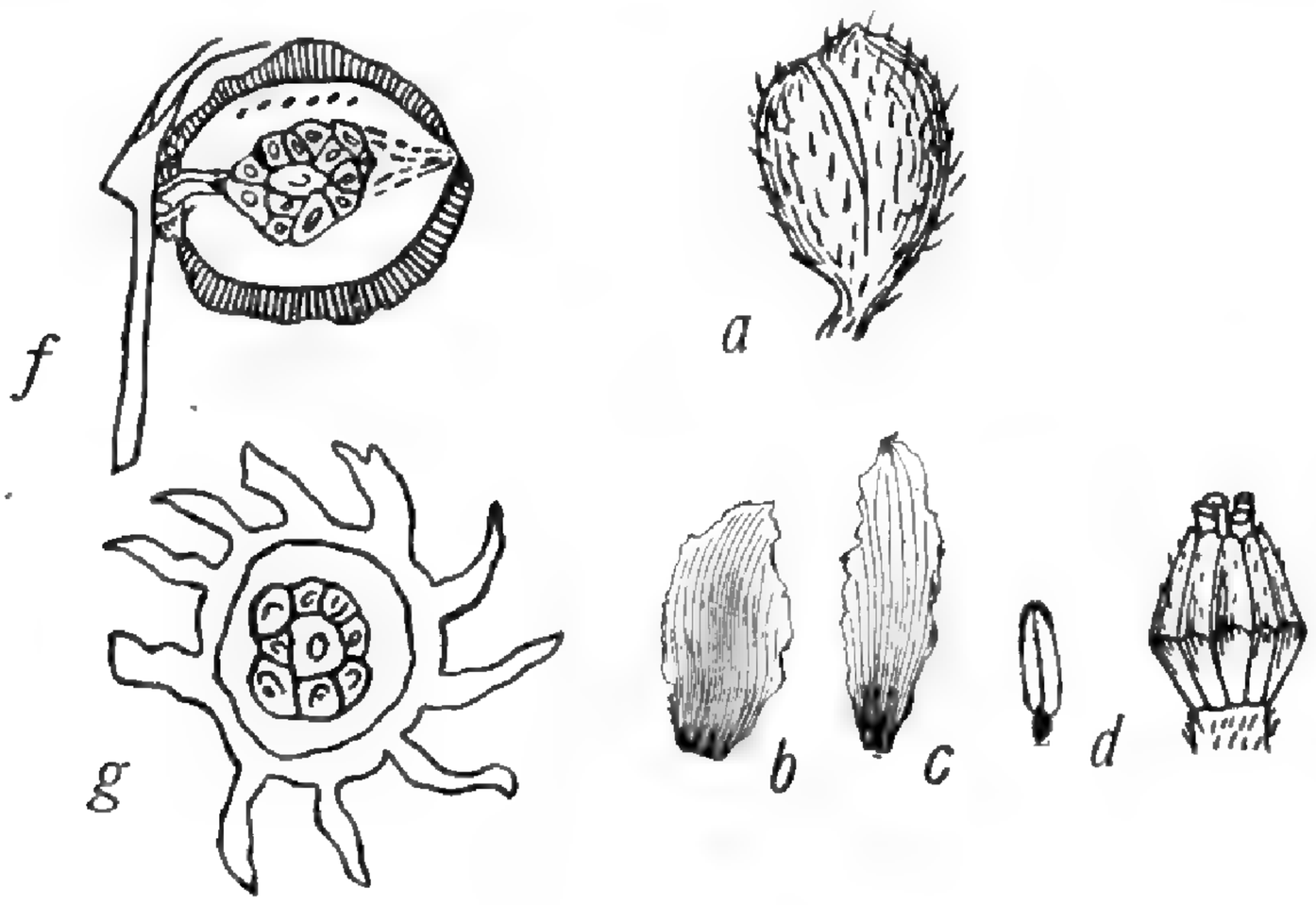

FIG. 15.—Flower and fruit of *Carpotroche platyptera*. *a*, Flower just before anthesis; *b*, interior petal; *c*, exterior petal; *d*, stamen; *e*, pistil; *f*, longitudinal, and *g*, transverse section of fruit. *a*, Natural size; *b*–*e*, scale about 3; *f*, *g*, scale ½.

obovate, more or less obtuse. Ovary ovoid, hairy, provided outside with 8 longitudinal wings. Placentas 4, parietal. Styles 4, free, very short.

Fruit a purple, pediceled, ovoid capsule, 3.5 to 4 cm. long, 3 cm. in diameter, ligneous, subpubescent, provided with 8 broad, undulate-margined wings, about 15 mm. broad in the middle; pedicel about 1 cm. long. Seeds obovate, flattened.

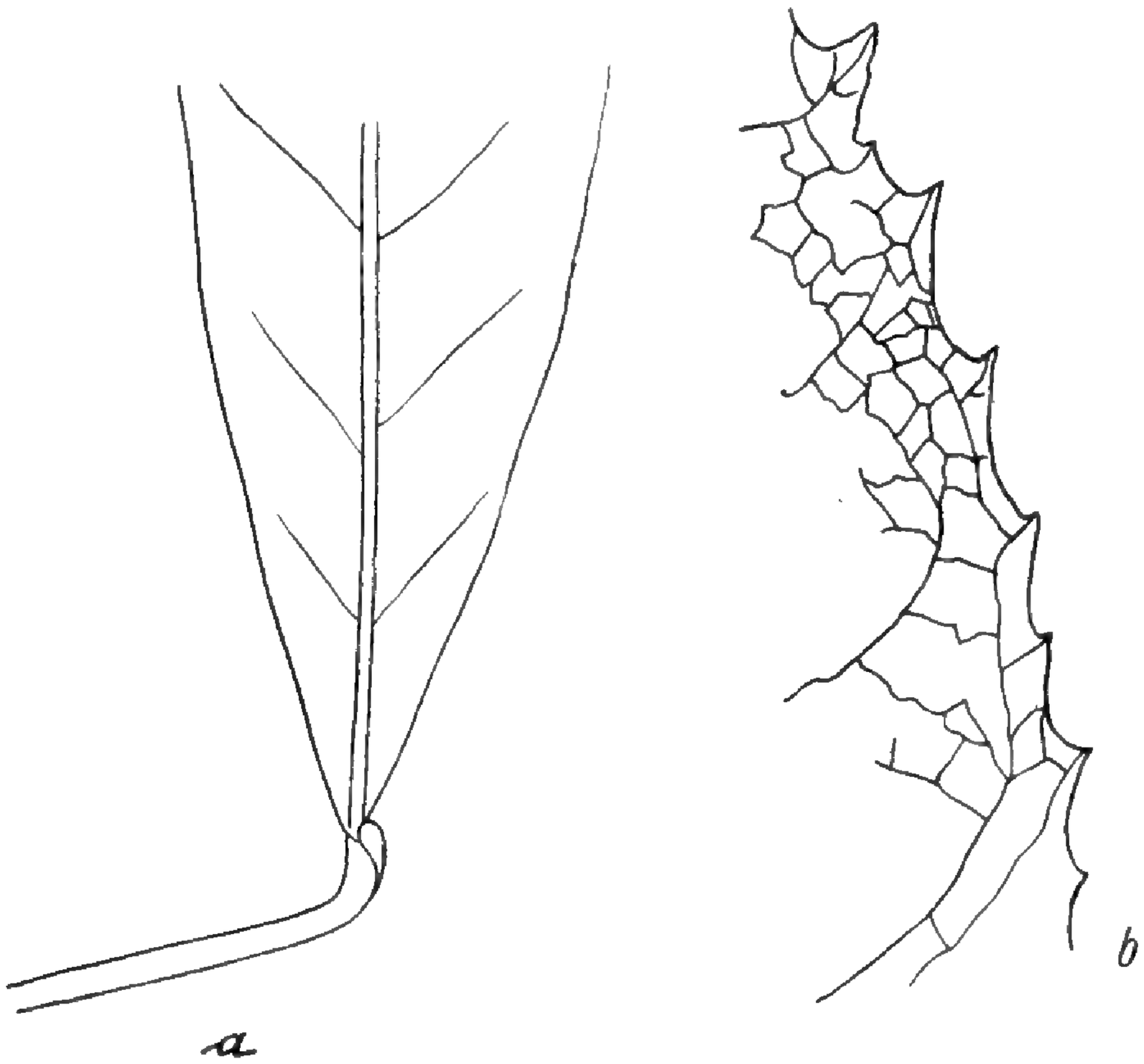

FIG. 16.—Leaf parts of *Carpotroche platyptera*. *a*, Leaf base; *b*, segment of margin. *a*, *b*, Natural size.

COSTA RICA: Rio Hondo, plains of Santa Clara, at an altitude of 50 to 100 meters; H. Pittier, flowers and fruit, February 15, 1903 (Instituto fís.-geog. Costa Rica no. 16634; U. S. National Herbarium no. 578981, type); same locality, in forest, fruit brick-red; Cook & Doyle, no. 485, flowers and fruit, May 6, 1903 (U. S. National Herbarium no. 474340); same locality, little-branched tree, 3 to 4 meters high, the flowers scattered on trunk or in axils of leaves; H. Pittier, flowers and fruit, June, 1903 (Instituto fís.-geog. Costa Rica no. 16702; U. S. National Herbarium no. 578983); same locality, H. Pittier, flowers and fruit, September, 1903 (Instituto fís.-geog. Costa Rica no. 16923; U. S. National Herbarium no. 578982).

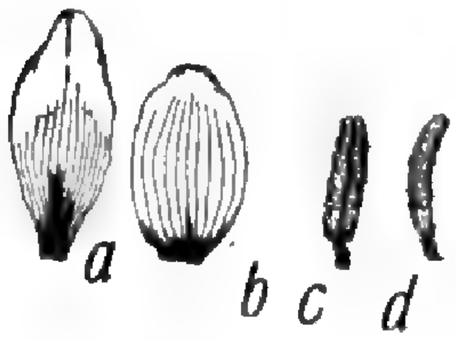

FIG. 17.—Flower parts of *Carpotroche crassiramea*. *a*, Exterior petal; *b*, interior petal; *c*, *d*, stamen, front and side view. *a*, *b*, Scale 6; *c*, *d*, scale 3.

EXPLANATION OF PLATE XIX.—Twigs of *Carpotroche platyptera* Pittier, showing small staminate flower, larger pistillate flower, and fruit. Scale ½.

Carpotroche crassiramea Pittier, sp. nov. FIGURES 17, 18.

A small tree, 1.5 to 2 meters high. Branchlets few, short, thick, pubescent, densely leafy toward their extremities.

Leaves large, coarse, almost entirely glabrous, shortly petiolate; petioles thick, 2 to 3 cm. long, flattened on upper side; leaf blades obovate, 45 to 65 cm. long, 16 to 20 cm. broad, long-attenuate at base, rounded or acuminate; midrib thick and very prominent beneath, slightly pubescent; secondary veins also prominent, arcuate and running into each other at marginal end, anastomosing through parallel, almost perpendicular venules; margin irregularly sinuate-dentate, the teeth broad, more or

less spatulate. Stipules caducous, lanceolate, acute, 18 to 20 mm. long, 4 to 5 mm. broad, pubescent outside.

Staminate inflorescence in sessile cymes in the axils of leaves or else on the branchlets. Pistillate flowers probably isolated in the axils of leaves. Bracts hairy, small, narrow, and acute. Staminate flowers on pedicels about 4 mm. long. Floral bud ovoid, 5 mm. long, 4 mm. broad; sepals 2. Petals pinkish white, the 3 exterior 5 mm. long and 3.5 to 4 mm. broad, the 4 interior 6 mm. long and 2.5 mm. broad. Stamens about 24; filaments not over 0.5 mm. long, flattened, broader at base; anthers linear. Pollen grains 0.09 mm. in diameter, with 3 or more poral points.

Pistillate flower unknown.

Fruit reddish, short-pedunculate, ovate, 3.5 cm. long, 2 cm. in transverse diameter, provided with 10 puberulent wings.

COSTA RICA: In forest around Banana River near Port Limon; Cook & Doyle, no. 424, flowers and fruit, May, 1903 (U. S. National Herbarium no. 474262, type, and no. 474263).

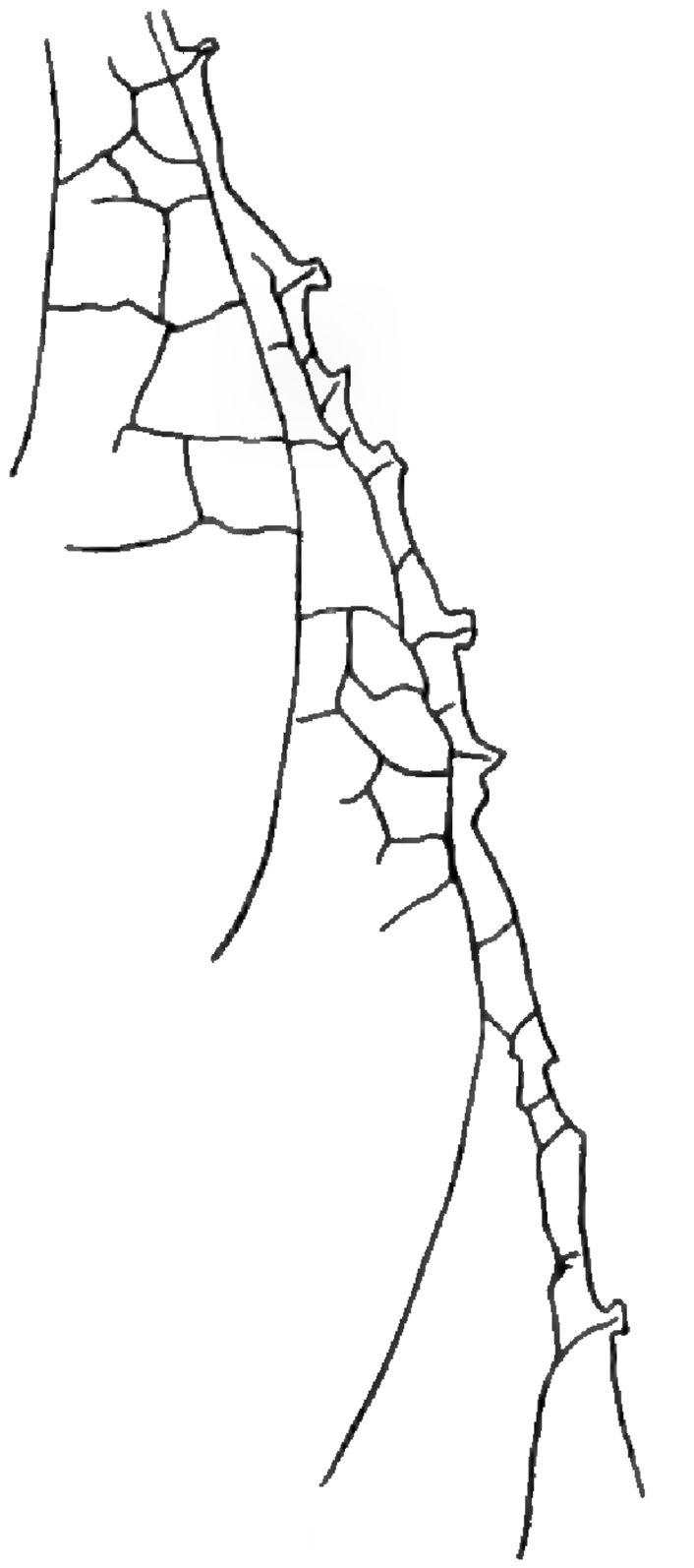

FIG. 18.—Leaf margin of *Carpotroche crassiramea*. Natural size.

Aegiphila anomala Pittier, sp. nov. FIGURE 19.

A small tree, 4.5 meters high, sparsely branched.

Leaves bunched at the ends of the shoots, shortly petiolate (petioles 1 to 2 cm. long); leaf blades 17 to 26 cm. long, 6 to 8 cm. broad, obovate, obtusely acuminate, long-cuneiform, paler beneath, smooth on both sides, with an entire, slightly revolute margin.

Flowers very odorous, in axillary, rather few-flowered cymes. Calyx 10 to 11 mm. long, rather narrow, campanulate, truncate, 3 to 5-parted, very much enlarged in the ripe fruit; lobules irregular, 3 mm. deep, slightly emarginate. Corolla rotaceous, rather small and included in calyx; tube subconical, 7 mm. long; lobes 5, about 6 mm. long, ovate, obtuse, imbricate, white. Stamens 5, equal, inserted very low on tube; scarcely emerging, finely hairy; filaments slender, slightly shorter than anthers; anthers elliptic-elongate, forming a tube around style. Ovary superior, spherical, surmounted by a slender, smooth style, this divided into two long filiform, woolly stigmas, emerging above the anthers. Fruit a hard nutlet, surrounded almost completely by the enlarged (15 mm. long, 15 mm. thick), verrucose calyx, almost spherical, 9 mm. in diameter, with a large stigmatic impression on tip, imperfectly 4-celled, with only one cell occupied by one seed.

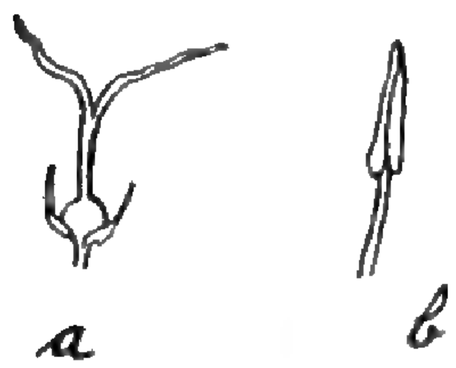

FIG. 19.—(*a*) Ovary and (*b*) stamen of *Aegiphila anomala*. *a*, *b*, Scale about 3.

This species belongs to the Cymosae amarinae.

COSTA RICA: Forests of Rio Hondo, llanos de Santa Clara, H. Pittier, flowers and fruit, July 5, 1903 (Instituto fís.-geog. Costa Rica, no. 16711; type U. S. National Herbarium no. 578905).

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SMITHSONIAN INSTITUTION

UNITED STATES NATIONAL MUSEUM

CONTRIBUTIONS

FROM THE

UNITED STATES NATIONAL HERBARIUM

VOLUME XII, PART 6

CATALOGUE

OF

THE GRASSES OF CUBA

By A. S. HITCHCOCK

WASHINGTON

GOVERNMENT PRINTING OFFICE

1909

BULLETIN OF THE UNITED STATES NATIONAL MUSEUM

ISSUED MARCH 23, 1909

PREFACE.

The accompanying paper by A. S. Hitchcock, Systematic Agrostologist of the United States Department of Agriculture, entitled Catalogue of the Grasses of Cuba, is the result of an exhaustive study of the material in the United States National Herbarium and in the herbarium of the Estación Central Agronómica de Cuba. It was chiefly through the efforts of Mr. Carl F. Baker, who obtained large collections in Cuba, that the specimens were made accessible to Mr. Hitchcock. It is hoped that this paper will be followed by similar ones upon other groups.

J. N. Rose,
Acting Curator.

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CATALOGUE OF THE GRASSES OF CUBA.

By A. S. Hitchcock.

INTRODUCTION.

The following list of Cuban grasses is based primarily upon the collections at the Estación Central Agronómica de Cuba, situated at Santiago de las Vegas, a suburb of Habana. The herbarium includes the collections made by the members of the staff, particularly Mr. C. F. Baker, formerly head of the department of botany, and also the Sauvalle Herbarium deposited by the Habana Academy of Sciences. These specimens were examined by the writer during a short stay upon the island in the spring of 1906, and were later kindly loaned by the station authorities for a more critical study at Washington. The Sauvalle Herbarium contains a fairly complete set of the grasses collected by Charles Wright, the most important collection thus far obtained from Cuba. In addition to the collections at the Cuba Experiment Station, the National Herbarium furnished important material for study, including collections made by A. H. Curtiss, W. Palmer and J. H. Riley, A. Taylor (from the Isle of Pines), S. M. Tracy, Brother Leon (De la Salle College, Habana), and the writer.

The earlier collections of Wright were sent to Grisebach for study. These were reported upon by Grisebach in his work entitled "Catalogus Plantarum Cubensium," published in 1866, though preliminary reports appeared earlier in the two parts of Plantae Wrightianae.[a] During the spring of 1907 I had the opportunity of examining the grasses in the herbarium of Grisebach in Göttingen.[b] In the present article I have, with few exceptions, accounted for the grasses listed by Grisebach in his catalogue of Cuban plants, and have appended a list of these with references to the pages in the body of this article upon which the species are considered. The numbers upon the labels of the Wright specimens in the Grisebach Herbarium are in many cases not the same as those under which the species were afterwards distributed and under which they were listed in the catalogue. These numbers I have designated as secondary numbers. Grisebach has sometimes connected on his labels the secondary number by the sign

[a] Mem. Amer. Acad. n. ser. Vol. VIII. Part I, pp. 153 to 192, (as separate) 1860; Part II, pp. 503 to 536, (as separate) 1862. The grasses were included in Part II.

[b] Unless otherwise stated the writer has examined all the types mentioned in this paper.

of equality with the distribution number. The data upon the Grisebach labels are meager, usually consisting of the number and year, together with an abbreviation for eastern or western Cuba. The distribution numbers of the grasses reported upon by Grisebach are all below 3500. Wright, after his return from Cuba, studied his collections at the Gray Herbarium and published his results in a series of articles in conjunction with Doctor Sauvalle, of Cuba.[a] In the

[a] Anales de la Academia de Ciencias, Médicas, Físicas y Naturales de la Habana, Volumes V to IX, 1868 to 1872. This was reset and, an index being added, published in 1873 as Flora Cubana. The introduction to the first installment of the series (**5**: 196. 1868) is as follows: "Revisio Catalogi Grisebachiani vel index plantarum cubensium ad catalogum Cl. Grisebachii anno 1866 editum attemperata, pluribus Wrightianis novis speciebus aucta, valde quoque emendata, a cl. C. Wright; omnia pro Annalibus Regiae Academiae Scientiarum Havanensis digesta, nominibusque adjectis cubensibus vulgo receptis a Francisco A. Sauvalle. Setiembre, 1868." Each continuation is headed "Revisto Catalogi Grisebachiani vel Index Plantarum Cubensium; a Francisco A. Sauvalle." The reprint has a title page as follows: "Flora Cubana. | Enumeratio Nova Plantarum Cubensium | vel | Revisio Catalogi Grisebachiani, | Exhibens | Descriptiones Generum Specierumque | Novarum | Caroli Wright, (Cantabrigiae) et Francisci Sauvalle, | Synonymis | nominibusque vulgaribus Cubensis adjectis. | Auctore | Francisco A. Sauvalle, | Academiae Scientiarum Havanensis. | Havanae. | Imp. "La Antilla," de cacho-negrete, | Calle de Cuba num. 51. | 1873.

The Gramineae appeared in Vol. VIII, 1871. The article was entirely reset for the reprint, but a comparison of this portion of the original with the reprint shows very few errors. In the original the serial numbers of the Gramineae occur as follows:

Numbers.	Page.	Numbers.	Page.
2721 to 2727	157	2798 to 2800	205
2728 to 2755	158	2801 to 2812	206
2756 to 2764	200	2813 to 2828	207
2765 to 2769	201	2829 to 2855	208
2770 to 2780	202	2856 to 2869	209
2781 to 2791	203	2870 to 2878	287
2792 to 2797	204	2879 to 2891	288

In the reprint the numbers are as follows:

Numbers.	Page.	Numbers.	Page.
2721 to 2737	190	2799 to 2812	197
2738 to 2764	191	2813 to 2819	198
2765 to 2769	192	2820 to 2844	199
2770 to 2776	193	2845 to 2869	200
2777 to 2789	194	2870 to 2884	201
2790 to 2796	195	2885 to 2891	202
2797 to 2798	196		

present paper the new species published in Sauvalle's article are credited to Wright. The original set upon which Sauvalle's list is based is at the Gray Herbarium, and a fairly complete duplicate set is in the Sauvalle Herbarium.

The sets of Wright's plants were made up at the Gray Herbarium and given herbarium distribution numbers. Each number included such collections as were thought to be of the same species. Thus it often occurs that different specimens of the same distribution number may have been collected in different localities or may even belong to different species. The data found upon the field labels in various herbaria are mentioned under each species in the present list. There is also appended a list of the species of grasses included in Sauvalle's Flora Cubana, with references to their identification, and a list of the Wright numbers in sequence with their identification.

The plan followed in the present paper is to give under specimens cited a list of the specimens found in the herbarium of the Estación Central Agronómica, including the Sauvalle Herbarium, and in the National Herbarium, without statement as to the herbarium in which they are deposited. To these are added specimens found in the Gray Herbarium which do not occur in the herbaria just mentioned, and finally, specimens in the Herbarium of the New York Botanical Garden (Herb. N. Y. Bot. Gard.), including the herbarium of Columbia University, of which the Torrey Herbarium forms a part, which are not found in the others mentioned. The specimens collected by the staff of the botanical department of the Cuba Experiment Station are numbered in a single series and are indicated in this list by the letters HC (Herbarium Cubae). The data for the Wright specimens, given in the paragraph devoted to the enumeration of specimens, are understood to be found with the specimens in the Sauvalle Herbarium. Additional data, found with specimens in other herbaria, are quoted in the succeeding paragraph devoted to notes.

Grisebach enumerated 154 species of grasses in his catalogue. Sauvalle's Flora Cubana includes 170 species. The present list includes 228 species or well-marked subspecies.

KEY TO THE GENERA.[a]

SERIES PANICEAE.—Spikelets 1-flowered, rarely 2-flowered; when 2-flowered the terminal floret perfect, the lower staminate or neutral (except in Isachne), no apparent internode between them; rachilla articulated below the glumes, the spikelets falling from the pedicels entire, singly, in groups, or together with joints of an articulate rachis; spikelets not laterally compressed (except in Lithachne).

Lemma and palea (the latter sometimes wanting in Andropogoneae) hyaline; glumes more or less indurated, the first largest; sterile lemma like fertile lemma in texture (except in Alloteropsis).

---

[a] In this key the tribal characters are given with reference to the Cuban genera only, and in some cases would not hold good for the entire tribe.

Staminate and pistillate spikelets in different inflorescences; pistillate spikelets inclosed in a bony bead-like involucre (MAYDEAE).....1. *Coix* (p. 190).
Spikelets all perfect, or unisexual and arranged in pairs, the pistillate sessile, the staminate pedicellate (or all pedicellate in Trachypogon). (ANDROPOGONEAE.)
Joints of the rachis much thickened and excavated to receive the spikelets.
First glume of the perfect spikelet flat or somewhat convex; perennials.
6. *Manisuris* (p. 191).
First glume of the perfect spikelet hemispherical, pitted; annual.
7. *Hackelochloa* (p. 191).
Joints of rachis not thickened nor excavated for the reception of the spikelets.
Spikelets all alike, perfect; inflorescence a plume-like panicle.
Axis of racemes continuous, not articulate; spikelets awnless.
2. *Imperata* (p. 190).
Axis of racemes articulated.
Spikelets awnless.....3. *Saccharum* (p. 190).
Spikelets awned.....4. *Erianthus* (p. 190).
Spikelets not alike.
All pedicellate; the perfect long-pedicellate, long-awned, the staminate short-pedicellate, awnless.....8. *Trachypogon* (p. 191).
Sessile and pedicellate, the former perfect, awned, the latter staminate, empty or wanting.
Perfect spikelets transversely rugose.....5. *Ischaemum* (p. 191).
Perfect spikelets not transversely rugose.
Sessile spikelets not all alike, the first to fifth pairs homogamous; awns 10 cm. long, stout; glumes bearing oil glands, lemon-scented when fresh.....13. *Heteropogon* (p. 196).
Sessile spikelets alike throughout.
Racemes of several to many joints, at least some of the racemes sessile.....9. *Andropogon* (p. 192).
Racemes reduced to 1 or 2 joints, all the racemes more or less pedunculate.
Pedicellate spikelets present, usually 2 to each sessile spikelet.....10. *Holcus* (p. 195).
Pedicellate spikelets wanting.
Awns not over 2 cm. long, delicate.
11. *Sorghastrum* (p. 195).
Awns over 10 cm. long, stout.
12. *Rhaphis* (p. 195).
Lemma and palea membranaceous or indurated; sterile lemma when present like the glumes in texture.
Lemma and palea membranaceous; axis of inflorescence not breaking up at maturity.
Spikelets 3 to 5 together, the clusters arranged in spikes, the glumes indurated. (ZOYSIEAE.)
Glumes covered with hooked spines.....14. *Nazia* (p. 196).
Glumes not spiny, united into a somewhat pitcher-shaped pseudoinvolucre.....15. *Anthephora* (p. 196).
Spikelets distinct, paniculate. (TRISTEGINEAE.)
Fertile lemma awned; rather robust grasses....16. *Arundinella* (p. 196).
Fertile lemma awnless; low grass with tuft of involute rather wiry basal leaves [doubtfully placed in this tribe].....17. *Triscenia* (p. 198).
Lemma and palea cartilaginous or chartaceous-indurated, conspicuously different in texture from the membranaceous glumes, rarely but little indurated. (PANICEAE.)

Spikelets unisexual; plants monœcious; blades abruptly contracted into petiole-like bases.
Inflorescence consisting of 2 slender racemes, one staminate the other pistillate, digitate at the summit of a naked culm; leafy stems distinct from the base; plants low .....44. *Mniochloa* (p. 233).
Inflorescence borne on leafy culms; fruit bony-indurated.
Fruit dorsally compressed; panicles terminal on culms or leafy branches, pistillate spikelets above, staminate spikelets below in same panicle .....42. *Olyra* (p. 233).
Fruit laterally compressed, conspicuously gibbous on upper dorsum; panicles all axillary or axillary and terminal, the terminal when present wholly staminate .....43. *Lithachne* (p. 233).
Spikelets all perfect.
Spikelets 2 to 4 together sunken in the alternate notches of a broad, thickened rachis; creeping grasses .....41. *Stenotaphrum* (p. 232).
Spikelets not sunken in notches of a thickened rachis.
Spikelets solitary or in small clusters subtended by an involucre consisting of 1 to many bristles (sterile branches), these sometimes grown together.
Involucre persistent on the axis, spikelets deciduous.
36. *Chaetochloa* (p. 230).
Involucre deciduous with and attached to the spikelets.
Involucre a spiny bur inclosing 1 to 5 spikelets.
37. *Cenchrus* (p. 231).
Involucre of distinct bristles.
Involucre of a single sterile branch produced beyond each spikelet .....40. *Paratheria* (p. 232).
Involucre of numerous often plumose bristles.
38. *Pennisetum* (p. 232).
Spikelets not involucrate.
Fruits not rigid, margins of lemma not inrolled.
Inflorescence of slender racemes, divergently digitate at the summit of the culm, both glumes wanting.
18. *Reimarochloa* (p. 198).
Inflorescence paniculate.
Blades cordate-clasping, fruit open at summit; aquatic or semiaquatic grasses.....29. *Hymenachne* (p. 212).
Blades not cordate-clasping.
Spikelets awned, first glume with a pedicel-like callus.....39. *Chaetium* (p. 232).
Spikelets awnless; fruits cartilaginous-indurated, papillose, usually dark-colored, lemmas with thin, usually white margins.
Fruit open at the white-margined summit; spikelets tuberculate-hispid between the nerves.....21. *Leptocoryphium* (p. 207).
Fruit not open nor white-margined at summit.
Sterile lemma like the fertile lemma in texture .....26. *Alloteropsis* (p. 210).
Sterile lemma like the glumes in texture.
Spikelets clothed with long silky hairs.....25. *Valota* (p. 210).
Spikelets glabrous or pubescent only.
24. *Syntherisma* (p. 208).

Fruits indurated-rigid (or if thin not open at the summit nor hyaline-margined).
Spikelets placed with the back of the fruit turned away from the main axis.
First glume and rachilla joint forming a swollen ring-like callus; fruit mucronate or shortly awn-pointed. 22. *Eriochloa* (p. 207).
First glume present or wanting, not forming a ring-like callus; spikelets in slender racemes.
First glume as long as the spikelet or nearly so; spikelets swollen on the side toward the axis and fitting into alternate hollows; inflorescence a single raceme .....27. *Mesosetum* (p. 211).
First glume wanting or not over one-fourth the length of the spikelet.
Racemes racemose along the main axis; first glume present.....28. *Brachiaria* (p. 212).
Racemes digitate or subdigitate, first glume wanting.....20. *Axonopus* (p. 207).
Spikelets with the back of the fruit turned toward the main axis.
Spikelets plano-convex, subsessile in spike-like racemes, typically lacking the first glume (both glumes wanting in *P. pulchellum*). 19. *Paspalum* (p. 199).
Spikelets unequally biconvex; paniculate, or if racemose the first glume present.
Fertile florets 2.....23. *Isachne* (p. 208).
Fertile floret 1.
Glumes awnless.
Second glume broad and saccate, panicle contracted or spike-like. 30. *Sacciolepis* (p. 212).
Second glume not broad nor saccate.
Margins of lemma inrolled; no lateral appendages nor excavations at base of fruit.....32. *Panicum* (p. 214).
Margins of lemma not inrolled; either lateral appendages or excavations at base of fruit. 33. *Ichnanthus* (p. 228).
Glumes or one of them awned, or cuspidate.
Fruit cuspidate, palea free at the tip; second glume and sterile lemma tapering into an awn or cuspidate point. 31. *Echinochloa* (p. 213).
Fruit not cuspidate, palea not free; awns arising from a toothed summit.
Spikelets clothed with rose-colored silky hairs; first glume minute. 34. *Tricholaena* (p. 229).
Spikelets pubescent with short pale hairs, first glume nearly as long as the second.35. *Oplismenus* (p. 229).

SERIES POACEAE.—Spikelets 1 to many-flowered, the imperfect or rudimentary floret, if any, uppermost; rachilla articulated (except in Oryzeae) above the glumes, which are persistent on the pedicel or rachis after the fall of the florets; when 2 to many-flowered a manifest internode of the rachilla separating the florets and articulated below them; spikelets laterally compressed.

Spikelets articulated below the glumes. (ORYZEAE.)

Spikelets unisexual, plants monoecious.

Spikelets in pairs, one large, perfect, sessile, the other small, staminate, long-pediceled; the broad oblanceolate blades with transverse veins between the longitudinal nerves.....45. *Pharus* (p. 234).

Spikelets not in pairs, the staminate and pistillate in different panicles; blades linear, not cross-veined.....46. *Luziola* (p. 234).

Spikelets all perfect.

Glumes wanting, lemma awnless.....48. *Homalocenchrus* (p. 234).

Glumes present.

Glumes minute, awnless; lemma awned except in cultivated forms. 47. *Oryza* (p. 234).

Glumes about as long as the floret or longer, awned.

Glumes tapering into awns; spikelets, including awns, over 3 cm. long.....49. *Achlaena* (p. 235).

Glumes awned from the notched apex; spikelets, including awns, scarcely 1 cm. long.....50. *Reynaudia* (p. 235).

Spikelets articulated above the glumes.

Culms woody, perennial, at least at the base, leaf blades commonly articulated with and deciduous from the sheath. (BAMBUSEAE.) 66. *Arthrostylidium* (p. 245).

Culms herbaceous, annual, leaf blades not articulated with the sheath.

Inflorescence of 1-sided spikes or racemes, spikelets sessile or nearly so. (CHLORIDEAE.)

Plants dicœcious or moncœcious, the staminate awnless, pistillate with numerous awns; low stoloniferous grass.....60. *Opizia* (p. 242).

Plants not dicœcious, spikelets all alike.

Spikelets with 1 perfect floret, sometimes 1 or more sterile florets above the perfect one.

No sterile florets, spikelets awnless, spikes slender, digitate. 54. *Capriola* (p. 238).

One or two sterile florets above the perfect one, spikelets generally awned.

Spikes digitate or approximate in apparent whorls at the summit of the culm.....55. *Chloris* (p. 238).

Spikes remote along the main axis..56. *Bouteloua* (p. 240).

Spikelets with 2 or 3 perfect florets.

Spikes alternate, more or less remote along the main axis, spikelets not crowded.....59. *Leptochloa* (p. 241).

Spikes digitate or nearly so, spikelets crowded.

Axis of spike not produced beyond the uppermost spikelet, glumes and lemmas not cuspidate...57. *Eleusine* (p. 241).

Axis of spike produced into a naked cuspidate point, glumes and lower lemmas cuspidate.58. *Dactyloctenium* (p. 241).

Inflorescence paniculate, sometimes contracted but spikelets never sessile in 1-sided spikes.

Spikelets 1-flowered. (AGROSTIDEAE.)

Lemma awnless.....53. *Sporobolus* (p. 237).

Lemma awned.
Lemma indurated, convolute, awn 3-fid (lateral awns minute or wanting in *A. scabra*) .....51. *Aristida* (p. 235).
Lemmas not indurated, tapering into a capillary awn.
52. *Muhlenbergia* (p. 237).
Spikelets 2 to many-flowered. (FESTUCEAE.)
Lemmas cleft above into a pappus-like crown of bristles.
61. *Pappophorum* (p. 242).
Lemmas entire.
Lemmas clothed with long silky hairs, tall, reed-like, dicecious grasses .....62. *Gynerium* (p. 242).
Lemmas not clothed with silky hairs.
Lemmas 3-nerved, not at all indurated .63. *Eragrostis* (p. 242).
Lemmas many-nerved, somewhat indurated and rigid.
Sterile lemmas 1 to 3 above the glumes; plants not dicecious .....64. *Uniola* (p. 245).
Sterile lemmas above glumes none; plants dicecious.
65. *Distichlis* (p. 245).

CATALOGUE OF GENERA AND SPECIES.

1. COIX L. Sp. Pl. 972. 1753.

1. **Coix lachryma-jobi** L. Sp. Pl. 972. 1753.

Pinar del Rio, *Baker & Abarca*, HC 3686; El Guama, *Palmer & Riley* 142.

This is originally from tropical Asia, but is now cultivated for ornament in the warmer regions of both hemispheres, whence it has escaped.

2. IMPERATA Ciril. Pl. Rar. Ic. **2:** 26. *pl. 11.* 1792.

1. **Imperata brasiliensis** Trin. Mem. Acad. Petersb. VI. **2:** 331. 1833.

La Magdalena, *Baker* HC 4946; Madruga, *Britton* 630; without locality, *Wright* 3486; Cienfuegos, *Combs* 701, in Gray Herbarium; Isle of Pines, *Curtiss* in 1904 in Herb. N. Y. Bot. Gard.; Pinar del Rio, *Shafer* 310 in Herb. N. Y. Bot. Gard.

The type in the Trinius Herbarium is from Serra da Lapa, Brazil, though Trinius in the original publication cites merely "V. spp. Brazil." *I. caudata* Trin., as shown by the type in the Trinius Herbarium, differs in having smaller spikelets (about 2.5 mm. long), longer and more copious hairs, and an elongated inflorescence. The spikelets of *I. brasiliensis* are 4 mm. long. Wright's specimen (3486) is the latter species as shown by the specimen in the herbarium of Grisebach and in that of Sauvalle. This is referred to *I. caudata* by Grisebach[a] and Sauvalle.[b]

3. SACCHARUM L. Sp. Pl. 54. 1753.

1. **Saccharum officinarum** L. Sp. Pl. 54. 1753.

Cienfuegos, *Pringle* 17; Guanajay, *Curtiss* 635.

This species (sugar cane) is grown in all tropical countries, and the above specimens are from cultivated plants.

4. ERIANTHUS Michx. Fl. Bor. Amer. **1:** 54. 1803.

1. **Erianthus saccharoides** Michx. Fl. Bor. Amer. **1:** 55. 1803.

Laguna San Mateo, Pinar del Rio, *Wright* 3903.

In Sauvalle's Flora Cubana this is called *Andropogon alopecuroides* L. The latter species, however, has a twisted awn, while in *E. saccharoides* the awn is straight or only slightly bent, not twisted.

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[a] Cat. Pl. Cub. 236. 1866.

[b] Anal. Acad. Cienc. Habana **8:** 288. 1871; Fl. Cub. 202.

5. ISCHAEMUM L. Sp. Pl. 1049. 1753.

1. **Ischaemum rugosum** Salisb. Icon. Stirp. Rar. 1791.
Madruga, *Curtiss* 533, "Wet ground beside railroad."
A native of southeastern Asia, introduced in Cuba.

6. MANISURIS L. Mant. Pl. **2:** 164, 300. 1771.

Outer glume transversely wrinkled.....1. *M. loricata.*
Outer glume with three longitudinal furrows.....2. *M. impressa.*

1. **Manisuris loricata** (Trin.) Kuntze, Rev. Gen. Pl. **2:** 780. 1891.
Rottboellia loricata Trin. Mem. Acad. Petersb. VI. **2:** 250. 1833.
Rottboellia filifolia Wright, Anal. Acad. Cienc. Habana **8:** 209. 1871; Fl. Cub. 200.
Herradura, *Baker* HC 2963, *Baker & Abarca* HC 4181, *Tracy* 9059, *Hitchcock* in 1906; Dayaniguas, *Wright* 3905.
Trinius's type specimen, which comes from Serra da Lapa, Brazil, has transversely rugose outer glumes, as in the Wright specimen.

2. **Manisuris impressa** (Griseb.) Kuntze, Rev. Gen. Pl. **2:** 780. 1891.
Rottboellia impressa Griseb. Cat. Pl. Cub. 235. 1866.
El Salado, *Wright* 3904.
The type specimen in Grisebach's herbarium is accompanied by the printed blank label with the year 1865, but no locality. The label also bears the secondary number 201.
The specimen in the Sauvalle Herbarium is from El Salado and is numbered 3904. The Wright specimen in the National Herbarium is numbered 3904 upon an 1865 label like that of the type. These may be all of the same collection.

7. HACKELOCHLOA Kuntze, Rev. Gen. Pl. **2:** 776. 1891.

1. **Hackelochloa granularis** (L.) Kuntze, Rev. Gen. Pl. **2:** 776. 1891.
Cenchrus granularis L. Mant. **2:** 575. 1771.
Manisuris granularis Sw. Prod. 25. 1788.
Punta Brava, *Baker* HC 4047; Madruga, *Shafer* 22, 65; Isle of Pines, *Palmer & Riley* 1084, 1092, *Curtiss* 493; Habana, *Leon* 213; La Magdalena, *Baker* 6; without locality, *Wright* 1553 in 1865; Herradura, *Tracy* 9100, 9101.
The Grisebach specimen is *Wright* 1553, collected in eastern Cuba, 1859. Wright's 1553 in the Gray Herbarium is from "open grassy places at Saltadera, Sept. 11."

8. TRACHYPOGON Nees, Agrost. Bras. 341. 1829.

Awn appressed-pubescent.....1. *T. filifolius.*
Awn strongly plumose.....2. *T. gouini.*

1. **Trachypogon filifolius** (Hack.)
Trachypogon polymorphus β filifolius Hack. in DC. Mon. Phan. **6:** 325. 1889.
In small tufts in pebbly pinales,[a] October, Pinar del Rio, *Wright* 3893; in large tufts, low damp pinales,[a] Pinar del Rio, *Wright* 3892; Herradura, *Baker* HC 2155.
This species is characterized by the elongated, closely convolute blades, the single racemes, and the erect awn 4 cm. long, short-pilose below, and by being glabrous throughout, except the slightly barbed nodes. Culm 100 to 150 cm. tall.

2. **Trachypogon gouini** Fourn. Mex. Pl. **2:** 66. 1886.
Torteleza de la Cabana, *Baker & Van Hermann* HC without number; San Francisco de Paula near Habana, *Leon* 209; Habana, *Leon* 300; Triscornia, *Tracy* 9086.
Awn 7 to 8 cm. long, very plumose to the tip.

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[a] Pine woods.

9. **ANDROPOGON** L. Sp. Pl. 1045. 1753.

Racemes numerous in a leafless terminal panicle ..... 7. *A. leucopogon.*
Racemes 1 to 4, solitary or fascicled from spathes.
  Racemes solitary.
    Spikelets awnless .....11. *A. spathiflorus.*
    Spikelets awned.
      Outer glume of sterile spikelet conspicuous and bract-like ..... 4. *A. fastigiatus.*
      Outer glume not conspicuous.
        Plants annual; racemes delicate ..... 2. *A. brevifolius.*
        Plants perennial; racemes not delicate.
          Racemes cylindrical, stiff and spike-like.
            Sterile pedicel ciliate its entire length; spikelets 5 to 6 mm. long..... 10. *A. semiberbis.*
            Sterile pedicel ciliate only at apex; spikelets 4 mm. long..... 12. *A. tener.*
          Racemes zigzag, axis lax and slender; spikelets about 3 mm. long.
            Racemes conspicuously villous..... 6. *A. gracilis.*
            Racemes sparsely villous, spikelets about 6 mm. long..... 3. *A. cubensis.*
  Racemes 2 to 4 from each spathe.
    Spathes numerous in a large corymb.
      Spikelets awnless ..... 1. *A. bicornis.*
      Spikelets long-awned..... 5. *A. glomeratus.*
    Spathes scattered or the inflorescence naked and terminal.
      Racemes shorter than the spathe.....13. *A. virginicus.*
      Racemes naked, terminal.
        Spikelets awned..... 9. *A. nashianus.*
        Spikelets awnless..... 8. *A. leucostachys.*

1. Andropogon bicornis L. Sp. Pl. 1046. 1753.

Arroyo Galiano, *O'Donovan* HC 5217; Santiago de las Vegas, *Wilson* 439; Pinar del Rio, *Palmer & Riley* 86; Isle of Pines, *Curtiss* 294; Retiro, in Savannas, *Wright* 3902; El Guama, *Palmer & Riley* 95; Nueva Gerona, *Palmer & Riley* 1125; without locality (1865) *Wright* 1555; Herradura, *Hitchcock* in 1906; Cienfuegos, *Combs* 265 in Gray Herbarium; Madruga, *Britton & Shafer* 773 in Herb. N. Y. Bot. Gard.

Wright's 770 from eastern Cuba (1859) is *A. bicornis* as shown by the specimen in Grisebach's herbarium.

Wright's 1555 as distributed consists in part of *Andropogon bicornis* and in part of *A. glomeratus*. The latter is distinguished by the long-awned spikelets.

2. Andropogon brevifolius Sw. Prod. 26. 1788.

Madruga, *Curtiss* 530; without locality, *Wright* 1558; Herradura, *Hitchcock* in 1906.

The Wright specimen in the National Herbarium bears a blank label of 1865. No. 1558 in the Grisebach Herbarium is from eastern Cuba, 1859, but the plant is *A. tener* (there has probably been some misplacement of labels here). In the latter herbarium is a specimen from western Cuba, 1863, with the secondary number 925, upon which Grisebach has marked "=1558." One sheet of *Wright* 1558 in the Gray Herbarium is *A. tener*, the other *A. brevifolius*, from "Pinales San Diego de Baños, Nov. 16."

3. Andropogon cubensis Hack. Flora **68:** 121. 1885.

Without locality, *Wright* 3898.

This number was not seen by Grisebach, but is listed in Sauvalle's Flora Cubana without specific name.

4. **Andropogon fastigiatus** Sw. Prod. 26. 1788.

Dry savannas October 26. *Wright* 3483.

No. 3483 of Wright, 1865, is accompanied by two supplementary labels, "Savannas, San Cristobal, Nov.," and "Culms few or single, sandy pine woods, Pinar del Rio, Dec." The Grisebach specimen of this is from "Cub. occ. 1863" and bears the secondary number "921=3483." No. 3485 [error for 3483?] in the Gray Herbarium was collected by Wright in 1860–64 in "sandy pine woods, Asiento Viejo, Los Remales, Dec. 2."

5. **Andropogon glomeratus** (Walt.) B.S.P. Prel. Cat. N. Y. 67. 1888.

Cinna glomerata Walt. Fl. Car. 59. 1788.

Andropogon macrourum Michx. Fl. Bor. Amer. **1:** 56. 1803.

Hanabana, *Wright* 1555; Isle of Pines, *Curtiss* 294, *Taylor* 18 in Herb. N. Y. Bot. Gard.; Batabano, *Shafer* 224; Habana, *Sthott* 103; Guanabacoa, *Leon* 565, 572; Santiago de las Vegas, *Wilson* 2207 in Herb. N. Y. Bot. Gard.; Matanzas, *Britton & Wilson* 83, 94 in Herb. N. Y. Bot. Gard.; Maraguana, *Wilson* 7553 in Herb. N. Y. Bot. Gard.

Wright's 1555 in the National Herbarium is *A. bicornis*. The specimen in the Grisebach Herbarium with this number is *A. glomeratus*, but it is from eastern Cuba, collected in 1859. In the Gray Herbarium one sheet of *Wright* 1555 (1859) is *A. glomeratus*, another (1865) is *A. bicornis*.

6. **Andropogon gracilis** Spreng. Syst. **1:** 284. 1825.

Schizachyrium gracile Nash in Small, Fl. Southeast. U. S. 60. 1903.

Wright 3484 [3480 in Sauv. Fl. Cub.] without data. Isle of Pines, *Curtiss* 380, *Taylor* 17; Buena Vista, *Shafer* in 1903; Herradura, *Baker & Dimmock* HC 4829, *Tracy* 9067; Candelaria, *Earle & Wilson* HC 1637; Calvario, *Leon* 562.

Wright's 3484 in the Grisebach Herbarium has a blank label of 1860–64, but is without other data. The Wright specimen of this species in the National Herbarium has a blank label of 1865, with the number 204 and also a tag in Wright's handwriting, "Pine woods, Cagalbana, Apr. 17." Wright's 1557, in the Grisebach Herbarium, "Cub. or." in 1859, is also *A. gracilis*. This species was described under *Andropogon scoparius* Michx. in Sagra's History of Cuba.[a]

7. **Andropogon leucopogon** Nees, Linnaea **19:** 694. 1847.

Isle of Pines, *Curtiss* 382; *Wright* 1556 in Grisebach Herbarium.

In the Grisebach Herbarium and in the Gray Herbarium *Wright* 1556 is labeled as collected in eastern Cuba in 1859. Curtiss's specimen was distributed under an unpublished name.

8. **Andropogon leucostachys** H.B.K. Nov. Gen. & Sp. **1:** 187. 1816.

Andropogon domingensis Roem. & Schult. Syst. **2:** 809. 1817.

Isle of Pines, *Curtiss* 314, *Taylor* 16; Madruga, *Baker* HC 3458; Herradura, *Earle* HC 3111, *Tracy* 9046, Consolacion del Sur, *Palmer & Riley* 480; bushy savannas, Hanabana, May 17, *Wright* 3900.

Grisebach's specimen of this has an 1865 label with the secondary number 202.

9. **Andropogon nasnianus** sp. nov.

Culms solitary or few in a cluster, simple, slender, erect, glabrous, 30 to 45 cm. high, nodes glabrous; sheaths glabrous or sparsely pilose toward the summit, much shorter than the elongated internodes, broader at the summit than the base of the

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[a] Rich. in Sagra, Hist. Cub. **11:** 320. 1850. The types of the grasses described by Richard in this work are at the Museum d'Histoire Naturelle at Paris. The types of Panicum were examined by the writer in the spring of 1907. Fragments from the types of five other species were later sent to the National Herbarium through the kindness of Director Le Comte.

blade thus forming more or less of a shoulder; blades narrow, folded, appressed, glabrous, 1 to 4 cm. long, 1 mm. wide, the basal as much as 10 cm. long, the uppermost reduced to points 1 to 3 mm. long; inflorescence at the summit of the naked culm, the peduncle long-exserted from the uppermost sheath; racemes in pairs 3 to 4 cm. long, very villous with tawny hairs 5 to 7 mm. long from the rachis and the sterile pedicel; sessile spikelets 3 to 4 mm. long, as long as or slightly longer than the internodes of the rachis; first glume nerveless between the scabrous keels, second glume slightly shorter than the first, sterile and fertile lemmas hyaline, slightly shorter than the second glume, the fertile lemma bearing an awn which extends 10 to 15 mm. beyond the spikelet; stamen 1; sterile pedicel 3 mm. long, bearing an involute scale 1 to 2 mm. long.

Type, Cuba, *Wright* 3899, no. 35320 in U. S. National Herbarium.

Sandy pine woods, western Cuba. In addition to the type this species is represented by: Herradura, *Hitchcock* in 1906, *Tracy* 9069.

The specimen of *Wright* 3899 in the Sauvalle Herbarium is labeled "Sandy pine woods, Pinar del Rio. Sept. Culms few or single, scattering."

This species is named for Mr. George V. Nash, who, while studying the species of Andropogon in the National Herbarium, suggested that the above-mentioned specimens did not belong to *A. leucostachys*, to which they had been referred. The species is allied to *A. leucostachys* H. B. K. and *A. subtenuis* Nash.

10. **Andropogon semiberbis** (Nees) Kunth, Enum. **1**: 489. 1833.

Schizachyrium semiberbe Nees, Agrost. Bras. 336. 1829.

Wright 3891 (in 1865).

11. **Andropogon spathiflorus** (Nees) Kunth, Enum. **1**: 496. 1833.

Hypogynium spathiflorum Nees, Agrost. Bras. 366. 1829.

Anatherum spathiflorum Griseb. Cat. Pl. Cub. 236. 1866.

Wright 3481; Herradura, *Baker & Dimmock* HC 4814; Isle of Pines, *Curtiss* 460, *Taylor* 23.

The Sauvalle specimen has two labels, "Savannas Dayaniguas Sept." and "Pinales, Dayaniguas Sept." Another sheet has a blank label, "3480 *Anatherum inerme* Gris." In the Grisebach Herbarium are two sheets of this, one marked 3481 on an 1860–64 label, and another marked "899=3481, Cub. occ. 1863." The specimen in the National Herbarium with the number 3481 has this on an 1865 label.

In the Grisebach Herbarium there are two other sheets of this species, marked *Anatherum inerme* Griseb., "3480 Cuba 1860–64," and "898=3480, Cub. occ. 1863." I have not seen the type of *Anatherum inerme* (Steud.) Griseb.[a] (*Andropogon inermis* Steud.)[b], which is from Venezuela, but Hackel places it under *Andropogon spathiflorus* as variety *inermis*.[c] I do not see that Wright's 3480 differs from 3481. Nees's type at Munich is the same. One sheet of this species in the Gray Herbarium is marked "3480=3481" and is from "pinales (wet), Los Almacigos, July 29;" another from the same locality is marked "3481=3480."

12. **Andropogon tener** (Nees) Kunth, Rev. Gram. **2**: 565. 1832.

Schizachyrium tenerum Nees, Agrost. Bras. 336. 1829.

Wright 3482; Herradura, *Tracy* 9065.

Grisebach's specimen is labeled "Cub. occ. 1863" and is numbered "914=3482." The Wright specimen in the National Herbarium has an 1865 label. Wright's 3482 in the Gray Herbarium is from "savannas, Almacigos, July 25." One sheet of Wright's 1558 in the Gray Herbarium is this species, the other is *A. brevifolius*.

13. **Andropogon virginicus** L. Sp. Pl. 1046. 1753.

Wright 3901; Santiago de las Vegas, *Baker & Wilson* HC 599; Guanabacoa, *Leon* 193.

The Sauvalle specimen has no data. The Wright specimen in the National Herbarium bears an 1865 label.

[a] Cat. Pl. Cub. 236. 1866.

[b] Syn. Pl. Glum. **1**: 390. 1854.

[c] Mart. Fl. Bras. **2**[3]: 296. 1883.

10. **HOLCUS** L. Sp. Pl. 1047. 1753.[a]

1. Holcus halepensis L. Sp. Pl. **2:** 1047. 1753.

Andropogon halepensis Brot. Fl. Lusit. **1:** 89. 1804.

Sorghum halepense Pers. Syn. **1:** 101. 1805.

Habana, *Curtiss* 561, *Leon* 271; Santiago de las Vegas, *Baker* HC 503, *Hitchcock* in 1906; Guanajay, *Palmer & Riley* 664, 815; without data, *Wright* 3488; Vedado, *Leon* 424.

Wright's 3488 in the Grisebach Herbarium bears the data, "Cub. or. 1860–64, fields near Matanzas."

11. **SORGHASTRUM** Nash in Britton, Man. 71. 1901.[b]

Awn 10 to 15 mm. long.....1. *S. francavillanum.*
Awn not over 2 mm. long.....2. *S. setosum.*

1. Sorghastrum francavillanum (Fourn.).

Andropogon francavillanus Fourn. Mex. Pl. **2:** 56. 1886.

Pinar del Rio, *Wright* 3896; Herradura, *Baker* HC 2179.

The Sauvalle specimen has two labels, "Sandy pine woods Oct.," and "Low savannas and pinales Sept." The Wright specimen in the National Herbarium has an 1865 label. This species has a loose panicle, with slender branches; the spikelets are about 5 mm. long, light brown, sparsely pilose on the lower half; the pedicel of the upper spikelet about 4 mm. long, awn 10 to 15 mm. long, once, or more or less twice, geniculate; blades long and folded or convolute, about 3 mm. wide. I have not seen Fournier's type of this, but his description applies to the Cuban plant.

2. **Sorghastrum setosum** (Griseb.).

Andropogon setosus Griseb. Cat. Pl. Cub. 235. 1866.

Wright 3897.

The specimen in Grisebach's herbarium, which is the type, has a blank label of 1865 and bears the secondary number 208. The Sauvalle Herbarium contains a specimen accompanied by a similar label with no. "208" and a second of the same kind, with no. "3897" and also a label with habitat, "Bushy savannas, Hanabana, June 1." This is a duplicate type. Wright's 3897 in the Gray Herbarium is from "Bushy savannas, Hanabana, June 6."

The inflorescence is comparatively dense; the spikelets smaller than in the preceding, only about 3 to 3.5 mm. long, long-pilose all over; pedicel of the upper spikelet 2 to 3 mm. long; awn none or short and exserted 1 to 2 mm.; blades flat, 5 mm. wide, about 15 cm. long.

12. **RHAPHIS** Lour. Fl. Cochinch. 552. 1790.

1. **Rhaphis pauciflora** (Chapm.) Nash in Small, Fl. Southeast. U. S. 67. 1903.

Sorghum pauciflorum Chapm. Bot. Gaz. **3:** 20. 1878.

Sandy pine woods, Pinar del Rio, *Wright* 3895; Isle of Pines, *Taylor* 46.

This is listed in Sauvalle's Flora Cubana as "*Andropogon* (*Chrysopogon*) *wrightii* Munro," but is without description. Under this are mentioned nos. 293 and 263.

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[a] *Holcus sorghum* L. must be considered the type of the genus Holcus since it is the most important economic species of the genus and further, since, in the fifth edition of his Genera Plantarum, Linnæus refers to the genus Sorgum Mich [eli] as a synonym of Holcus.

[b] Poranthera Raf. (Ser. Bull. Bot. **1:** 221. 1830) has for its type *Andropogon nutans* L., but the name was previously used for a genus of Euphorbiaceae (Rudge, Trans. Linn. Soc. **10:** 302. 1811). The type species of Sorghastrum Nash is *Andropogon avenaceum* Michx., which is the same as *A. nutans* L.

The latter I have not seen. Wright's 293 is in the Gray Herbarium, labeled as above, with the herbarium name of Munro.

13. HETEROPOGON Pers. Syn. 2: 533. 1807.

1. **Heteropogon contortus** (L.) Roem. & Schult. Syst. 2: 836. 1817.
Andropogon contortus L. Sp. Pl. 2: 1045. 1753.
Andropogon secundus Willd.; Nees, Agrost. Bras. 364. 1829, in note.
Eastern Cuba, *Wright* 1559.

This specimen is in the Grisebach Herbarium and is listed in Grisebach's catalogue of Cuba plants as *Andropogon* (*Heteropogon*) *secundus*. (*Heteropogon secundus* Presl is a species of Trachypogon.) Sauvalle lists no. 1559 as *Andropogon contortus*, but there is no specimen of this number in the Sauvalle Herbarium. One is found, however, in the Gray Herbarium.

14. NAZIA Adans. Fam. Pl. 2: 31, 581. 1763.

1. **Nazia aliena** (Spreng.) Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 17: 28. 1899.
Lappago aliena Spreng. Neue Entd. 3: 15. 1822.
Wright 3489, without data.

The Grisebach specimen was collected "1860–64." This is listed in Sauvalle's Flora Cubana as *Lappago racemosa*.

15. ANTHEPHORA Schreb. Beschr. Gräs. 2: 105. *pl. 44*. 1810.

1. **Anthephora hermaphrodita** (L.) Kuntze, Rev. Gen. Pl. 2: 759. 1891.
Tripsacum hermaphroditum L. Syst. ed. 10, 2: 1261. 1759.
Anthephora elegans Schreb. Beschr. Gräs. 2: 105. 1810.

In sand along the shore La Palma Sola, Aug. 7, *Wright* 3890; Santiago de las Vegas, *Van Hermann* HC 2694, *Hitchcock* in 1906; Herradura, *Baker* HC 2691; La Magdalena, *Baker* HC 3634; Cienfuegos, *Combs* 257 in Gray Herbarium.

This is listed in Sauvalle's Flora Cubana as 3870. The Sauvalle specimen is marked 3890, as is the specimen in the National Herbarium. The former specimen is accompanied by a second label with the secondary number 308, which is the only number with the Grisebach specimen.

16. ARUNDINELLA Raddi, Agrost. Bras. 37. *pl. 1. f. 3*. 1823.

Awn bent, tightly twisted below.....2. *A. martinicensis*.
Awn bent, but not tightly twisted.
Blades flat, over 1 cm. wide; panicle dense, 30 cm. or more long.....1. *A. deppeana*.
Blades more or less folded, less than 1 cm. wide; panicle loose, not elongated.....3. *A. peruviana*.

1. **Arundinella deppeana** Nees, Bonplandia 3: 84. 1855.
Arundinella phragmitoides Griseb. Cat. Pl. Cub. 234. 1866.

Wright 3479; Madruga, *Curtiss* 662, *Britton & Shafer* 647 in Herb. N. Y. Bot. Gard.; Pinar del Rio, *Palmer & Riley* 70; *Shafer* 304 in Herb. N. Y. Bot. Gard.; without locality, *Otto* 268.

Grisebach's specimen is from western Cuba in 1863 and is numbered "933=3479." I have not seen Nees's type, "*Seemann* n. 428, Panama." Nees describes the awn as 6 lines long, strongly geniculate in the middle and not twisted. This can only apply to *A. phragmitoides* and to *A. peruviana*. Nees further states that the leaves are smooth and one-half inch wide, and the panicle over a foot long and 4 inches thick. This applies best to *A. phragmitoides*, though the blades are usually more or less pilose. Specimens in the National Herbarium are as follows: Mexico: *Lieb-*

mann 629, 630; *Langlassé* 608; *C. T. Smith* 1892; *Botteri* 730, 731, 734; *Palmer* 1264, 1920. Guatemala: *Heyde & Lux* 3907; *Maxon & Hay* 3526; *Rock* in 1887; World's Fair Commission in 1893. Salvador: *Renson* 207. Costa Rica: *Tonduz* 9211.

2. **Arundinella martinicensis** Trin. Gram. Pan. 62. 1826.
Arundinella pallida Nees, Agrost. Bras. 465. 1829.
Thysanachne scoparia Presl, Rel. Haenk. 253. 1830.
Wright 3478.

The Grisebach specimen is from eastern Cuba in 1860 and numbered "113=3478." Wright's 3478 in the Gray Herbarium is from San Juan de Buenavista, Nov. 21. These were compared with the type of Nees at Munich and that of Trinius at St. Petersburg (from Martinique, *Sieber* 262). This species has an elongated dense panicle, more or less folded blades, the bent awn twisted below. It ranges from Cuba and Mexico to Brazil, and is represented in the National Herbarium by the following: Porto Rico: *Heller* 934, 4355, 6256; *Sintenis* 361, 5797; *Barrett* 101. Santo Domingo: *Wright, Parry & Brummel* 626. Jamaica: *Eggers* 3514. Mexico: *Palmer* 434. Costa Rica: *Pittier* 11005; *Tonduz* 3672. Brazil: *Glaziou* 17433; *Regnell* 1414 (III).

Thysanachne scoparia Presl was published in the Symbolae Botanicae, the title page date of which is 1832 and which, hence, is later than the Reliquiae Haenkeanae. But the part containing the above species must have been published earlier, for in the latter work[a] is cited "*T. scoparia.* Presl de thysanachne, 1829. cum icone." There appears to be no such work by Presl except the portion of the Symbolae (pages 11 and 12 and pl. 6) where Thysanachne and *T. scoparia* are described as if they were there originally published. The species is based on *Sieber* 264 from Martinique. Presl's type from Mexico was examined at Prague.

Pilger[b] refers the Porto Rico species to *A. hispida* (Willd.) Kuntze (*Andropogon hispidus* Willd.), to which he also refers *A. brasiliensis* Raddi. I have not seen the type of either of the last two species, but in Trinius's herbarium is the type of *Goldbachia mikani* Trin., which is included by Pilger in the list of synonyms of *A. hispida*. This I consider distinct from *A. pallida*, as did Nees,[c] and it is what I take to be *A. brasiliensis* Raddi. This is also the *A. brasiliensis* of Hackel in Martius's Flora Brasiliensis, as indicated by plate 38 and by specimens so named received from Professor Hackel. The spikelets are smaller and the awn shorter, sometimes scarcely exserted. This species is represented in the National Herbarium by the following: Mexico: *Liebmann* 622, 635. Colombia: *Pittier* 1527. British Guiana: Mount Roraima Exped. 254. Brazil: *Glaziou* 17921, 20567 a; *Henschen* in 1868, *Dusén* 3875. Uruguay: *Arechavaleta.*

3. **Arundinella peruviana** (Presl) Steud. Syn. Pl. Glum. **1:** 115. 1854.
Thysanachne peruviana Presl, Rel. Haenk. 253. 1830.
Arundinella cubensis Griseb. Mem. Amer. Acad. n. ser. **8:** 533. 1862.[d]
Arundinella crinita Trin. Linnaea **10:** 299. 1836.
Wright 1552.

Sheaths and blades pilose, the latter narrow and more or less folded, usually less than 0.5 cm. wide; panicle rather loose, not elongated as in *A. martinicensis;* awn slender and bowed back like a shepherd's crook, but not twisted. The type of *A. cubensis* from eastern Cuba, no. 1552 in 1859, is in the Grisebach Herbarium. Another specimen also from eastern Cuba, 1860, is numbered "115=1552."

The types above cited, namely, those of Presl at Prague, Grisebach at Göttingen, and Trinius at St. Petersburg, agree with each other and are well characterized by the shape of the awn. Additional specimens in the National Herbarium are as follows: Mexico: *Liebmann* 621, 625, 632, 634; *Bourgeau* 1660, 2223; *Palmer* 12, 526,

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[a] Rel. Haenk. 253.
[b] In Urb. Symb. Antill. **4:** 80. 1903.
[c] Agrost. Bras. 465. 1829.
[d] Pl. Wright. 2.

652; *Pringle* 3133. Guatemala: *Cook & Griggs* 691. Costa Rica: *Pittier* 2407, 11246; *Biolley* 7469; *Tonduz* 4867. Brazil: Commis. Geogr. S. Paulo 2800.

In the collection of Haenke at the herbarium of the German University at Prague there are, under *Thysanachne peruviana*, two specimens. One is accompanied by the label, "Peruan. mont. guanoc. Hanke." This specimen corresponds to Presl's description of this species and agrees with a duplicate in the Bernhardi Herbarium at the Missouri Botanical Garden figured by Scribner.[a] The other specimen is *A. martinicensis* Trin.

17. **TRISCENIA** Griseb. Mem. Amer. Acad. n. ser. **8:** 534. 1862.

1. **Triscenia ovina** Griseb. Mem. Amer. Acad. n. ser. **8:** 534. 1862.

Banks of creeks, May 28, *Wright* 756.

The Grisebach specimen is from eastern Cuba in 1859, no. 756.

Grisebach[b] cites this number also under *Isachne leersioides*. This appears to be an error, as in Grisebach's herbarium this number occurs only with *Triscenia ovina*. Wright's 756 in the Gray Herbarium is from "banks of Pinal Creek in small dense tufts, Monte Verde, Aug. 10, 1859."

18. **REIMAROCHLOA** gen. nov.

Spikelets lanceolate, acuminate, solitary, subsessile along one side of a flattened narrow rachis (the back of the fertile lemma turned toward it), forming few to several slender racemes, approximate at the summit of the culm, spreading or reflexed at maturity; glumes obsolete except in the terminal spikelet in which one glume is frequently present; sterile lemma exceeding the fruit; fertile lemma scarcely indurated, faintly nerved, long-acuminate, inrolled at the base only, the palea of similar texture, free nearly half its length.

Perennials of the tropics and subtropics of the Western Hemisphere.

The genus Reimaria as established by Flügge on the single differentiating character "uniglumis," included three species, the first two of which, *R. candida* and *R. elegans*, differ from Paspalum only in having spikelets without glumes, a character which is unreliable in this group of Paniceae. The third species, *R. acuta*, together with those added to Reimaria by later authors, constitutes a distinct genus distinguished by the characters in the diagnosis above. Considering that Flügge's three species are not congeneric, but that the first two on the one hand and the third on the other must be separated, it is necessary that the name Reimaria go with the larger group.[c] Reimaria then becomes a synonym of Paspalum, or if the glumeless species, *P. candidum* H. B. K., *P. pulchellum* H. B. K., *P. elongatum* Griseb., etc., be considered generically distinct, the name would apply to this group. For *R. acuta* and its allied species the above name is proposed with *Reimaria acuta* Flügge as the type: **Reimarochloa acuta** (Flügge). *Paspalum vaginatum* Sw. and *P. distichum* L. (in which both glumes are occasionally present) in habit and texture of the acute fruits show a closer affinity to this genus than do the glumeless species mentioned above.

Spikelets about 2 mm. long.....1. *R. brasiliensis.*
Spikelets about 5 mm. long.....2. *R. oligostachya.*

1. **Reimarochloa brasiliensis** (Spreng.).

Agrostis brasiliensis Spreng. Nov. Prov. Hal. 45. 1819.
Reimaria brasiliensis Schlecht. Bot. Zeit. **10:** 17. 1852.
Panicum oxyanthum Steud. Syn. Pl. Glum. **1:** 41. 1854.
Wright 3437; Isle of Pines, *Curtiss* 497.

Grisebach's specimen of this number is from "savannas, Hanabana, May 22." Another specimen in his herbarium from "low wet ground around ponds, Hanabana"

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[a] Rep. Mo. Bot. Gard. **10:** *pl. 6.* 1899.
[b] Cat. Pl. Cub. 234. 1866.
[c] American Code, Canon 15 (Bull. Torr. Club **31:** 175. 1904); Vienna Code, Art. 45.

bears the secondary number 206. The specimen in the Gray Herbarium is labeled, "Wet savannas, Candelaria, June 5, 1860–64." The type of *Panicum oxyanthum* Steud. labeled "Ins. St. Domingo, Legit Poiteau 1802 cf. hrbr Delessert 54" in the museum at Paris, is a small specimen of this species; that in the Delessert Herbarium is a good specimen.

2. **Reimarochloa oligostachya** (Munro).

Reimaria oligostachya Munro; Benth. Journ. Linn. Soc. **19**: 34. 1882.

Wright 3854 in National Herbarium.

This number of Wright's is mentioned in the original description, though the type is *Curtiss* 3566 from Florida. The specimen in the Sauvalle Herbarium with the number 3854 is *Paspalum vaginatum* Sw. In the Grisebach Herbarium is a specimen of *Reimarochloa oligostachya* labeled "Damp ground around ponds Hanabana," 1865, and bearing the secondary number 180. The sheet of *Wright* 3854 in the Gray Herbarium bears two plants of *R. oligostachya* and one of *Paspalum distichum*.

19. PASPALUM L. Syst. ed. 10, 855. 1759.

Rachis dilated and membranaceous..... 9. *P. dissectum.*
Rachis not dilated and membranaceous.
  Racemes terminal and also from the uppermost sheath.
    Blades pubescent on both surfaces..... 7. *P. debile.*
    Blades glabrous or nearly so, often ciliate on margins.
      Blades ciliate, 4 to 5 mm. wide.....25. *P. propinquum.*
      Blades not ciliate.
        Blades less than 2 mm. wide; first glume obsolete.....27. *P. rigidifolium.*
        Blades about 1 cm. wide; first glume present..23. *P. pedunculatum.*
  Racemes terminal only.
    Racemes in pairs—that is, normally 2 and approximate.
      Plants with creeping rootstocks.
        Spikelets pubescent on convex surface.....10. *P. distichum.*
        Spikelets glabrous on convex surface.....30. *P. vaginatum.*
      Plants without creeping rootstocks.
        Both glumes obsolete.....26. *P. pulchellum.*
        First glume only obsolete.
          Spikelets circular 1.5 mm. long or less.
            Spikelets papillose or nearly glabrous..22. *P. papillosum.*
            Spikelets villous on the margins ..... 6. *P. conjugatum.*
          Spikelets lanceolate or elliptical, 2 mm. long or more.
            Spikelets loosely imbricated; spikes ascending.....15. *P. lineare.*
            Spikelets densely imbricated; spikes spreading.
              Spikelets 2 mm. long.....18. *P. minus.*
              Spikelets 3 mm. long.....20. *P. notatum.*
  Racemes 1 to several; if 2, the lower at some distance below the terminal and the number not constant.
    Racemes usually 1, sometimes 2.
      Spikelets transversely wrinkled.
        Blades involute, glabrous, elongated, 40 to 60 cm. long.....12. *P. filiforme.*
        Blades flat, pubescent, 5 to 15 cm. long...19. *P. nanum.*

Spikelets not transversely wrinkled.
Pubescence glandular..... 5. *P. clavuliferum.*
Pubescence if present not glandular.
Spikelets about 1 mm. long.....29. *P. rupestre.*
Spikelets 2 to 3 mm. long.
Blades short, 10 cm. long, villous..28. *P. rottboellioides.*
Blades elongated 30 to 50 cm.
long, glabrous..... 1. *P. alterniflorum.*
Racemes more than 1, often numerous.
First glume present..... 4. *P. ciliiferum.*
First glume obsolete.
Sterile lemma transversely wrinkled;
spikelets brown.
Spikelets obovate.....24. *P. plicatulum.*
Spikelets elliptical.....11. *P. elatum.*
Sterile lemma not transversely wrinkled.
Racemes few, mostly 2 to 4.
Spikelets flattened.....16. *P. lividum.*
Spikelets distinctly convex.
Spikelets pubescent.
Pubescence glandular... 2. *P. arenarium.*
Pubescence not glandular..... 3. *P. caespitosum.*
Spikelets glabrous.
Spikelets elliptical,
about 1 mm. wide ....13. *P. glabrum.*
Spikelets circular, about
2 mm. wide.....14. *P. hemicryptum.*
Racemes numerous.
Spikelets pubescent.
Spikelets hemispherical,
slightly exceeding 1 mm.
long.....21. *P. paniculatum.*
Spikelets flatter, 2 mm. long..31. *P. virgatum.*
Spikelets glabrous.
Axis long-pilose..... 8. *P. densum.*
Axis not pilose.
Spikelets elliptical,
about 3 mm. long.....32. *P. virgatum schreberianum.*
Spikelets obovate-circular, 2 to 2.5 mm. long..17. *P. millegrana.*

1. **Paspalum alterniflorum** Rich. in Sagra, Hist. Cub. **11**: 299. 1850.

Paspalum dolichophyllum Hack. Inf. Est. Centr. Agron. Cuba **1**: 409. 1906.

Wright 3841; Guanabacoa, *Leon* 117 in part; Habana, *Tracy* 9105, *Baker, Tracy & Hasselbring* in 1907, *Leon* 564, 585; Marianao, *Leon* 581. Calabazon, *Baker & O'Donovan* HC 4545; Matanzas, *Rugel* 894 in Herb. N. Y. Bot. Gard.

Grisebach's specimen of this species was collected in 1865 and is accompanied by the data, "In small dense tufts, low savannas, Hanabana, May 19." The sheet bears the secondary number 167. The Sauvalle specimen is accompanied by the two numbers, 3841 and 167, thus connecting the two. In the Grisebach Herbarium is a specimen of this collected in Cuba by Rugel and numbered 753a. Grisebach refers[a] to "Rug. 894" under this name. Richard's type is at Paris.

[a] Cat. Pl. Cub. 231. 1866.

2. **Paspalum arenarium** Schrad.; Schult. Mant. **2:** 172. 1824.
Paspalum simpsoni Nash, Bull. Torr. Club **24:** 29. 1897.
Wright 3443 in part, in National Herbarium, and in Gray Herbarium.

Spikelets similar to those of *P. caespitosum* (*Wright* 3443, in part, in National Herbarium), but glandular-pubescent; leaves mostly near the base of the plant, the blades ciliate on the margins, otherwise glabrous, flat, less than 10 cm. long, 5 to 6 mm. wide; spikes 1 to 3.

From this *P. longepedunculatum* Le Conte of the southeastern United States differs in having glabrous spikelets and longer, thinner blades. *Pittier* 1847 from Honduras should also be referred to *P. arenarium*.

3. **Paspalum caespitosum** Flügge, Mon. Pasp. 161. 1810.

Low wet woods, Pinar del Rio, September, *Wright* 3443 in part; Cojimar, *Baker* HC 2899, 2903, *Hitchcock* in 1906; Trocha, *Tracy* 9087, *Hitchcock* in 1906; Habana, *Leon* 268; Batabano, *Hitchcock* in 1906; Matanzas, *Britton & Wilson* 11, 236 in Herb. N. Y. Bot. Gard., *Britton & Shafer* 63 in Herb. N. Y. Bot. Gard.

Grisebach's specimens of this are labeled "910=3443" from western Cuba, 1863, and "97=3443" from eastern Cuba, 1860. A third "290=3444," collected in 1865, agrees with these and not with 3444 [see *P. clavuliferum* Wright]. There are two sheets of Wright's specimens in the Gray Herbarium numbered 3444, of which one is *Paspalum clavuliferum*, the other *P. caespitosum*. The latter is labeled "In crevices of rocks in the channel of the river Santa Cruz, Aug. 27." Wright's 3443 in the Gray Herbarium is labeled "Rocky ridges, Holguin-Barajugua, Aug. 21."

4. **Paspalum ciliiferum** (Nash).
Dimorphostachys ciliifera Nash in Small, Fl. Southeast. U. S. 78. 1903.

Arroyo Naranjo, *Leon* 587; Matanzas, *Britton & Wilson* 148; Madruga, *Britton & Shafer* 751, both in Herb. N. Y. Bot. Gard. .

5. **Paspalum clavuliferum** Wright, Anal. Acad. Cienc. Habana **8:** 203. 1871; Sauv. Fl. Cub. 195.
Paspalum falcula Doell in Mart. Fl. Bras. 2^2 : 60. 1877.
Wright 3444 in National Herbarium.

This resembles *P. papillosum* Spreng., but the spikes are usually solitary instead of in pairs and the spikelets obovate instead of orbicular. The type of this is in the Gray Herbarium. The plant in the Sauvalle Herbarium under this number is a different species, as are the two specimens in the Grisebach Herbarium which are said to be "=3444" (cf. *P. caespitosum* and *P. rupestre* of this list). Salzmann's specimen in Trinius's herbarium from Bahia, labeled *Paspalum horticola* Salzm., belongs to this species. Salzmann's name was mentioned as a synonym by Steudel under *P. papillosum*.[a] To *P. clavuliferum* may be referred *Pringle* 2359 and 11762 from Mexico, and *Smith* 175 from Colombia.

6. **Paspalum conjugatum** Berg. Act. Helv. **7** : 129. 1772.

Roadsides, Hanabana, *Wright* 767; Herradura, *Baker* HC 2672, *Hitchcock* in 1906; mountains north of San Diego de los Baños, *Palmer & Riley* 541; Santiago de las Vegas, *Baker* HC 2658, 2659, *Wilson* 543, 1006, *Hitchcock* in 1906; Sagua, *Britton & Wilson* 265; valley of the St. Augustine, *Britton & Wilson* 510, 515; Guajay, *Wilson* 342; Habana, *Wilson* 1277, *Leon* 302. The following are in the herbarium of the New York Botanical Garden: Isle of Pines *Curtiss* in 1904; Santiago de Cuba, *Taylor* 146; Baracoa, *Underwood & Earle* 1162; Cuba, *Rugel* 788; Matanzas, *Rugel* 912.

7. **Paspalum debile** Michx. Fl. Bor. Amer. **1:** 44. 1803.
Paspalum villosissimum Nash, Bull. Torr. Club **24:** 40. 1897.
Herradura, *Hitchcock* in 1906.

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[a] Steud. Syn. Pl. Glum. **1:** 17. 1854.

8. **Paspalum densum** Poir. in Lam. Encycl. **5**: 32. 1804.

Dense bunches in ponds, Pinar del Rio, September, *Wright* 3447.

There is a second specimen of this species in the Sauvalle Herbarium, without locality, erroneously numbered 3462. In the Grisebach Herbarium there are two specimens of this species, one from western Cuba, 1863, numbered "866=3447," the other from "Low wet savannas; Hanabana," 1865.

9. **Paspalum dissectum** (L.) L. Sp. Pl. ed. 2. 81. 1762.

Panicum dissectum L. Sp. Pl. 57. 1753.

Paspalum membranaceum Walt. Fl. Car. 75. 1788.

Low grounds around ponds, procumbent. Hanabana, June 10, *Wright* 169 [Secondary number].

The same number occurs in the Grisebach Herbarium. A second specimen of this species, from eastern Cuba, 1860, is numbered "98=3440." The specimen in the National Herbarium is numbered 3440. For a discussion of the type of *P. dissectum* L., see Contr. Nat. Herb. **12**: 115. 1908.

10. **Paspalum distichum** L. Syst. Nat. ed. 10. **2**: 855. 1759.

Wright 1546; Habana, *Curtiss* 764; Santiago de las Vegas, *Baker & Wilson* 385; Playa de Marianao, *Palmer & Riley* 848; Herradura, *Tracy* 9056; Isle of Pines, *Curtiss* in 1904; Matanzas, *Britton & Wilson* 67, both in Herb. N. Y. Bot. Gard.

Grisebach's specimen of Wright's 1546 is from eastern Cuba; a second specimen of the same species is from western Cuba, 1863, and is numbered "911=1546." In the National Herbarium is a sheet of Wright's with the secondary number 292 which is part this species and part *P. vaginatum* Sw.

11. **Paspalum elatum** Rich.; Doell in Mart. Fl. Bras. **2**^{2}: 78. 1877.

Wright 3843.

This specimen is referred to this species from description only, as no authentic specimens of *P. elatum* have been examined. It is a much taller grass than *P. plicatulum* Michx., which it resembles, with more elliptical and less convex spikelets.

12. **Paspalum filiforme** Sw. Prod. 22. 1788.

Paspalum swartzianum Flügge, Mon. Pasp. 96. 1810.

Paspalum approximatum Doell in Mart. Fl. Bras. **2**^{2}: 82. 1877.

In pastures forming tufts, Retiro, July, *Wright* 769; Isle of Pines, *Curtiss* 523, 374, *Palmer & Riley* 949; Guanabacoa, *Hitchcock* in 1906; Rincon, *Britton & Wilson* 477 in Herb. N. Y. Bot. Gard.

Grisebach's specimen of *Wright* 769 was collected, "1860–1864," "in the edge of woods, Hanabana, May 28." Another of his specimens with the secondary number 165, in 1865 is also from Hanabana, May 23, "in small tufts."

Doell [a] refers *P. filiforme* Sw. to *P. caespitosum* Flügge. This is not the plant that Swartz describes, as is shown by the original description in the Prodromus and the later amplified description in his Flora.[b] Swartz describes his plant as having a single spike, ovate spikelets, and filiforme leaves, while *P. caespitosum* has 3 to 5 spikes, oblong-obovate spikelets, and flat blades.

13. **Paspalum glabrum** Poir. in Lam. Encycl. **5**: 30. 1804.

Paspalum bakeri Hack. Inf. Est. Centr. Agron. Cuba **1**: 410. 1906.

Habana, *Baker* 1824; Triscornia, *Hitchcock* in 1906; without locality, *Wright* 298; Matanzas, *Rugel* 869 in Herb. N. Y. Bot. Gard.

In the Grisebach Herbarium is a specimen of *P. glabrum* labeled, "In small tufts, sand banks near the sea, Palma Sola, July 15," 1865, and bearing the secondary number

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[a] Loc. cit.

[b] Fl. Ind. Occ. **1**: 136. 1797.

298. This species is represented in the Gray Herbarium by *Wright* 3846, a number which is not mentioned in Sauvalle's Flora Cubana. *P. helleri* Nash[a] of Porto Rico differs in having somewhat smaller pubescent spikelets.

14. **Paspalum hemicryptum** Wright, Anal. Acad. Cienc. Habana **8:** 204. 1871; Sauv. Fl. Cub. 196.

Paspalum inops Vasey, Contr. Nat. Herb. **1:** 281. 1893.

Low savannas, El Salado, August, *Wright* 3847.

The type of *P. inops* Vasey (*Palmer* 592 from Guadalajara, Mexico, in the National Herbarium) agrees with Wright's type in the Gray Herbarium.

15. **Paspalum lineare** Trin. Gram. Pan. 99. 1826.

Herradura, *Baker* 3459; Isle of Pines, *Curtiss* 379.

The type in the Trinius Herbarium is from Brazil, collected by Langsdorff, and is included in the same cover with *P. angustifolium* Nees. Trinius published the latter name on the same page of the work cited, but preceding *P. lineare* on the page. The type is said to be from "Brazil (N. ab Esenb.)." The type specimen is labeled "*Paspalum angustifolium* N. ab Es. In Brasilia. Mis Auctore." This specimen, however, is not *P. lineare*, but has, as described, smaller spikelets with rugose transversely wrinkled glumes. *P. angustifolium* as described three years later[b] is the same as *P. lineare* Trin., while variety β is *P. angustifolium* as described by Trinius. Consequently *P. neesii* Kunth is a typonym of *P. angustifolium*, since Kunth changes the name of the latter on account of the earlier *P. angustifolium* Le Conte, but the name does not apply to the Cuba plant under consideration.

16. **Paspalum lividum** Trin.; Schlecht. Linnaea **2:** 383. 1854.

Habana, *Leon* 272, 571, *Tracy* 9119; Marianao, *Leon* 588.

This Mexican species is probably a recent introduction into Cuba. The type from Hacienda de la Laguna, Mexico, *Schiede*, in the Trinius Herbarium, is included in the cover of *P. denticulatum* Trin., but the two specimens are not the same species. The latter has larger spikelets.

17. **Paspalum millegrana** Schrad.; Schult. Mant. **2:** 175. 1824.[c]

Paspalum underwoodii Nash, Bull. Torr. Club **30:** 375. 1903.

Paspalum lentiginosum Presl, err. det. Mez in Urban, Symb. Antill. **4:** 82. 1903.

Habana, *Tracy* 9121; without locality, *Wright* 3840.

The Sauvalle specimen is also numbered 170. As I have not examined Schrader's type the reference to this is only provisional and based on description. Our specimens are the same as *P. vulnerans* Salzm., from Bahia, as distributed to the National Herbarium. Other specimens in the National Herbarium to be referred here are: Porto Rico: *Britton & Cowell* 1449, *Heller* 4368, *Goll* 923, *Underwood & Griggs* 149. Jamaica: *Britton* 841 in Herb. N. Y. Bot. Gard.

18. **Paspalum minus** Fourn. Mex. Pl. **2:** 6. 1886.

Herradura, *Baker & Abarca* HC 4180, *Tracy* 9093, *Hitchcock* in 1906; Isle of Pines, *Palmer & Riley*, 978; without locality, *Wright* 3438; Guanabacoa, *Leon* 117 in part; La Magdalena, *Baker* 2. The following are in the herbarium of the New York Botanical Garden: Sagua, *Britton & Wilson* in 1903; Pinar del Rio, *Shafer* 477; Isle of Pines, *Curtiss* in 1904.

These agree with the duplicate type in the National Herbarium (Mexico, *Bourgeau* 2298). The spikelets are about 2 mm. long. Wright's 3438 in the National Herbarium is partly this and partly *P. notatum*. Grisebach's specimen, from western Cuba, 1863, numbered "936=3438," is all *P. minus*. The other specimens in this cover

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[a] Bull. Torr. Club **30:** 376. 1903.

[b] Nees, Agrost. Bras. 64. 1829.

[c] The specific name as used by Schrader is a noun.

have spikelets 3 mm. long and are *P. notatum* (Jamaica, *Alexander;* Trinidad, *Sieber* 364, labeled *P. taphrophyllum* Steud.; Antigua, *Wullschlaegel*). A part of *Wright* 3438 in the Torrey Herbarium is *P. minus* and a part is *P. notatum*.

19. **Paspalum nanum** Wright; Griseb. Cat. Pl. Cub. 230. 1866.

Paspalum caudicatum Wright, Anal. Acad. Cienc. Habana **8**:205. 1871; Sauv. Fl. Cub. 196.

Wright 176 (secondary number); sandy pine woods, Pinar del Rio, October, *Wright* 3866; Herradura, *Hitchcock* in 1906; Isle of Pines, *Taylor* 40, *Curtiss* in 1904, both in Herb. N. Y. Bot. Gard.

The type of *P. nanum* is *Wright* 176 in the Grisebach Herbarium, collected in "Bushy savannas, Hanabana, June 1," 1865. This agrees with *Wright* 3866, the type of *P. caudicatum*, in the Gray Herbarium.

The specimen in the National Herbarium is numbered 3842. The specimen in the Grisebach Herbarium bears the label, "176. Bushy savannas. Hanabana, June 1."

Spikelets sent by Professor Le Comte[a] from the plant supposed to be the type of *Paspalum lindenianum* Rich.[b] show this plant to be the same as *P. nanum* Wright, but this species does not agree with Richard's description in so far as the blades are said to be glaucous and glabrous except the ciliate margins, while in *P. nanum* the blades are pubescent on the surface. Pending a further examination of the type the name *P. nanum* is retained.

20. **Paspalum notatum** Flügge, Mon. Pasp. 106. 1810.

Herradura, *Hitchcock* in 1906, *Baker* HC 2968; Arroyo Galiano, *O'Donovan* HC 5210; Isle of Pines, *Palmer & Riley* 1119; Lomas de Managua, *Baker & Wilson* HC 299; Habana, *Baker*, *Tracy & Hasselbring* HC 3097, *Tracy* 9118; Guines, *Leon* 117b; Matanzas, *Britton & Wilson* 444 in Herb. N. Y. Bot. Gard.

As stated above, a part of *Wright* 3438 in the National Herbarium is this species and a part is *P. minus* Fourn. The spikelets of the species as here understood are about 3 mm. long. The type has not been examined. The Baker & Wilson plant, HC 299, cited above, is larger than the other specimens, with spikelets 4 mm. long, and may be a distinct species. Wright's 3438 in the Gray Herbarium is *P. notatum;* it is labeled "Savannas Chirigote, July 11." This number in the Torrey Herbarium is part *P. notatum* and part *P. minus*.

21. **Paspalum paniculatum** L. Syst. Nat. ed. 10. **2:** 855. 1759.

Savannas, Retiro, *Wright* 766; San Diego de los Baños, *Palmer & Riley* 544; El Guama, *Palmer & Riley* 179a; hills near Candelaria, *Earle & Wilson* HC 1625; Guines, *Leon* 579; Cienfuegos, *Combs* 295 in Gray Herbarium. The following are in the herbarium of the New York Botanical Garden: Matanzas, *Britton & Shafer* 576; Santiago de Cuba, *Taylor* 377; Jaguey, *Eggers* 5317.

Grisebach's specimen is from eastern Cuba, 1859, no. 766. Nash[c] applies this name to *Panicum fasciculatum* Sw., but as has been shown elsewhere[d] the name *Paspalum paniculatum* L. should be applied to the Linnæan plant, as heretofore, and not to the Sloane plate cited, through error, by Linnæus.

22. **Paspalum papillosum** Spreng. Nov. Prov. Hal. 47. 1819.

Paspalum pittieri Hack. Oesterr. Bot. Zeitschr. **51:** 233. 1901.

Low savannas, Chirigote, October 26, *Wright* 3844; Herradura, *Baker* HC 2954, 4185, *Hitchcock* in 1906.

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[a] See footnote, p. 193.

[b] Rich. in Sagra, Hist. Cub. **11**:299. 1850. The type is *Linden* 1813.

[c] Bull. Torr. Club **30:** 381. 1903.

[d] Contr. Nat. Herb. **12:** 116. 1908.

I have not seen the type of this species, but in the Trinius Herbarium there is a specimen labeled "*Paspalum papillosum* Sprengel, mis. cl. auctor." The Cuban plants agree with this, except that the spikelets are less glandular, the flat surface being quite glabrous. Agreeing with Sprengel's specimen are two in the Trinius Herbarium, one collected by Salzmann in Bahia labeled "*Paspalum horticola*, *maritima* Salzm." and another by Riedel at Bahia in 1831. Tonduz's 4474 from Costa Rica belongs here. Wright's 3444 in the Torrey Herbarium is *P. papillosum*.

23. **Paspalum pedunculatum** Poir. Encycl. Suppl. **4:** 315. 1816.
Paspalum decumbens Sw. Prod. 22. 1788, not Rottb. 1778.
Panicum decumbens Roem. & Schult. Syst. **2**:429. 1817.
Paspalum vaginiflorum Steud. Syn. Pl. Glum. **1**: 19. 1854.
Dimorphostachys pedunculata Fourn. Mex. Pl. **2**: 15. 1886.
Banks of Rio San Sebastian, Pinar del Rio, December, *Wright* 3851; Isle of Pines, *Curtiss* 327.
A second Wright label reads, "Damp woods, Rangel, Dec."
Steudel's type, from "Guiana, *Lenormand*" is in the museum at Paris.

24. **Paspalum plicatulum** Michx. Fl. Bor. Amer. **1:** 45. 1803.
Savannas, Retiro, *Wright* 768; in small tufts, pinales, Pinar del Rio, *Wright* 3839; Magay, *Baker & Wilson* HC 354; Santiago de las Vegas, *Wilson* 420, 421, 425, *Baker* 2056, 3112, 3113, 3454, *Baker & Wilson*, 545, 596, *Hitchcock* in 1906; La Magdalena, *Baker* 5, 7; Habana, *Tracy*, 9117; Herradura, *Tracy* 9051, 9052, *Hitchcock* in 1906; Isle of Pines, *Palmer & Riley* 947, *Taylor* 38; Cienfuegos, *Combs* 262 in Gray Herbarium. The following are in the herbarium of the New York Botanical Garden: Isle of Pines, *Curtiss* in 1904; Alto Cedro, *Underwood & Earle* 1621; Matanzas, *Britton & Wilson* 429; Sagua, *Britton & Wilson* 280, 285, 337; La Soledad, *Eggers*, 5405.
The Grisebach specimen, from "edge of savannas, Hanabana, May 19," 1856, bears the secondary number 166. Wright's 768 in the Gray Herbarium is labeled, "Savannas, Chirigote, July 11."

25. **Paspalum propinquum** Nash, Bull. N. Y. Bot. Gard. **1:** 291. 1899.
Wright 3845.

26. **Paspalum pulchellum** Kunth, Mem. Mus. Hist. Nat. **2:** 68. 1815.
Reimaria elegans Flügge, Mon. Pasp. 216. 1810, not *Paspalum elegans* Kunth, Enum. **1**: 59. 1833.
Wright 3439; Herradura, *Hitchcock* in 1906; Isle of Pines, *Curtiss* in 1904 in Herb. N. Y. Bot. Gard.
The specimen in the National Herbarium bears the secondary number 171. One of the Grisebach specimens is from western Cuba in 1863, and is numbered "915=3439;" the other bears the secondary number 171 and is labeled "Bushy savannas, Hanabana, May 24, 1865." One sheet of this in the Torrey Herbarium is numbered 3839.

27. **Paspalum rigidifolium** Nash, Bull. N. Y. Bot. Gard. **1:** 292. 1899.
Wright 3442.
The Grisebach specimen of this species, collected in western Cuba in 1863, bears the number "905=3442." Wright's 3442 in the Gray Herbarium is labeled "Savannas, Chirigote, July 11."

28. **Paspalum rottboellioides** Wright, Anal. Acad. Cienc. Habana **8:** 204. 1871; Sauv. Fl. Cub. 195.
Wright 3864; Isle of Pines, *Curtiss* 375, *Taylor* 41; Herradura, *Baker & Dimmock* HC 4813.
The type of this species is *Wright* 3864 in the Gray Herbarium.

29. **Paspalum rupestre** Trin. Linnaea **10:** 293. 1836.

Wright 3444, 3445; near Habana, *Hitchcock* in 1906; *Leon* 286.

The Grisebach specimen is from eastern Cuba, 1860, numbered "109=3445," and is labeled, "*Paspalum lindenianum* Rich. (Megaphyllum Steud.)," under which name it is listed in Grisebach's Catalogue of Cuban Plants.[a] A second specimen is from western Cuba, 1863, and is numbered "939=3445." A third specimen collected in 1863 and numbered "943=3444," is included by Grisebach in his cover of *P. caespitosum*. Wright's 3445 in the Gray Herbarium is labeled "Pinales near Baracoa, June 15."

30. **Paspalum vaginatum** Sw. Prod. 21. 1788.

Digitaria foliosa Lag. Gen. & Sp. Nov. 4. 1816.

Hanabana, Doctor Robbins, *Wright* 3854; Habana, *Curtiss* 751; Batabano, *Baker* HC 2294, 1863.

The characters which separate this from *P. distichum* L., the glabrous spikelets and more or less suppressed midnerve of the glume, may prove to be inconstant. Grisebach's specimen from western Cuba, 1863, numbered 947, is this species. A part of *Wright* 1546 (1546a) in the Torrey Herbarium has glabrous spikelets, and consequently would be referred to *P. vaginatum*.

Lagasca's type, labeled "*Digitaria foliosa* sp. n. ex Havana, Boldo iter," is in the herbarium of the Botanical Garden at Madrid.

31. **Paspalum virgatum** L. Syst. Nat. ed. 10. **2:** 855. 1759.

Paspalum leucocheilum Wright, Anal. Acad. Cienc. Habana **8:** 203. 1871; Sauv. Fl. Cub. 194.

Isle of Pines, *Curtiss* 501, *Taylor* 42, *Palmer & Riley* 1057; without locality, *Wright* 3446; La Magdalena, *Baker* HC 3626, *Britton & Shafer* 243 in Herb. N. Y. Bot. Gard.; Santiago de las Vegas, *Baker* HC 544, 595; Las Acostas, *Baker* HC 5242, 5246; Batabano, *Baker* HC 3967; Arroyo Galiano, *Baker* HC 5211; Habana, *Tracy, Baker & Hasselbring* HC 3085, *Tracy* 9120, 9122, 9123, 9124; Guanabacoa, *Leon* 195; Herradura, *Tracy* 9127, *Hitchcock* in 1906; San Diego de los Baños, *Palmer & Riley* 628; Guines, *Leon* 578, Pinar del Rio, *Shafer* 479 in Herb. N. Y. Bot. Gard.; Matanzas, *Britton & Wilson* 155, 455 in Herb. N. Y. Bot. Gard.

Grisebach's specimen is numbered 302 (labeled *β stramineum*), while the specimen in the Sauvalle Herbarium bears this number in addition to no. 3446. The type specimen of *P. leucocheilum* Wright is in the Gray Herbarium. The spikelets are somewhat smaller than normal (2 mm. long), and the inflorescence consists of a single spike partially concealed in the uppermost sheath. The spikelets have the shape and pubescence of *P. virgatum*.

31a. **Paspalum virgatum schreberianum** Flügge, Mon. Pasp. 190. 1810.

Guanajay, *Palmer & Riley* 813 in part; Herradura, *Hitchcock* in 1906; Batabano, *Hitchcock* in 1906; Habana, *Tracy* 9125, 9126; *Wright* 3446 in Gray Herbarium; *Rugel* 898 in Gray Herbarium; Isle of Pines, *Curtiss* in 1904 in Herb. N. Y. Bot. Gard. Cienfuegos, *Combs* 262 in Herb. N. Y. Bot. Gard.

This differs from *P. virgatum* in its scarcely pilose rachis and oblong-obovate, acute, glabrous spikelets. It appears to be a distinct species, but as the type has not been examined, our plants are referred as above, rather than separated under a new name. This form appears to be included in *P. virgatum glabriusculum* by Doell in Martius's Flora Brasiliensis.[b] Wright's 3446 in Gray Herbarium is labeled, "In large tufts on sand bars of the Baracoa near N. Sophie, Sept. 11."

32. **Paspalum** sp.

Wright 3848.

This specimen in the Sauvalle Herbarium is too fragmentary to identify. It appears to belong to none of the species enumerated in the list. It is listed in Sau-

[a] See note under *P. nanum*.

[b] **2**[2]: 89. 1877.

valle's Flora Cubana as "*P. swartzianum* Flügg?," but it is not that species as here understood. The specimen in the Gray Herbarium is less fragmentary. The blades are long and narrow, 30 or 40 cm. long and less than 1 mm. wide; terminal spike single; spikelets glabrous, 1.5 mm. long. A part of *Wright* 3444 in the Gray Herbarium appears to be this species.

20. AXONOPUS Beauv. Agrost. 12. 1812.

1. **Axonopus compressus** (Sw.) Beauv. Agrost. 12. 1812.
   Milium compressum Sw. Prod. 24. 1788.
   Paspalum compressum Rasp. Ann. Sci. Nat. I. **5:** 301. 1825.

Wet places in roads and elsewhere Zarabanda, May 21, *Wright* 3849, *Wright* 3850. *Wright* 763 in Gray Herbarium; Isle of Pines, *Curtiss* 306, 511; Habana, *Curtiss* 606, *Leon* 298; Herradura, *Hitchcock* in 1906, *Tracy* 9092; San Antonio, *Baker* HC 2946, *Hitchcock* in 1906; Santiago de las Vegas, *Hitchcock* in 1906; Managua, *Baker & Wilson* 314 in Herb. N. Y. Bot. Gard.; Matanzas, *Britton & Wilson* 104 in Herb. N. Y. Bot. Gard.

In the Grisebach Herbarium are two specimens of this species, one of 1865 labeled, "Roadside, Hanabana, May 18," and bearing the secondary number 168, and one of no. 765, 1860–64. The Sauvalle specimen of *Wright* 3850 has two labels, with localities El Salado and Retiro. This number has narrower blades and larger spikelets, about 3 mm. long. This may be *Paspalum tristachyon* Lam.,[a] the type of which I have not seen. The sheet of *Wright* 3849 in the Gray Herbarium bears also a specimen of *Syntherisma digitata*.

21. LEPTOCORYPHIUM Nees, Agrost. Bras. 83. 1829.

1. **Leptocoryphium lanatum** (H. B. K.) Nees, Agrost. Bras. 83. 1829.
   Paspalum lanatum H. B. K. Nov. Gen. & Sp. **1:** 94. 1816.

Wright 3429; Isle of Pines, *Palmer & Riley* 440, 972, *Curtiss* 393; La Magdalena, *Baker* HC 4555; Herradura, *Hitchcock* in 1906, *Tracy* 9048, 9071. The following are in the herbarium of the New York Botanical Garden: Santa Clara, *Britton & Wilson* 335; Pinar del Rio, *Shafer* 481; Cedro, *Underwood & Earle* 1451, 1459.

Grisebach's specimen, from western Cuba in 1863, is numbered "919=3429." Wright's 3429 in the Gray Herbarium is labeled, "Wet savannas, Candelaria, June 3," and "Savannas near Pinar del Rio, Dec. 11."

22. ERIOCHLOA H. B. K. Nov. Gen. & Sp. 1: 94. *pl. 30. 31.* 1816.

Blades filiform.....1. *E. filifolia.*
Blades flat.
  Fruit tipped with a slender awn 1 mm. long; blades 7 to 15 mm. wide.....2. *E. punctata.*
  Fruit merely apiculate; blades 2 to 3 mm. wide.....3. *E. ramosa.*

1. **Eriochloa filifolia** sp. nov.

Plant cespitose; culms numerous, very slender, almost capillary, glabrous, 10 to 20 cm. high, erect or more or less geniculate below; leaves glabrous, blades very narrow, convolute-setaceous, the lower about 10 cm. long, the upper shorter, the uppermost 1 to 2 cm.; spikes mostly 2, erect, 1 to 2 cm. long, one terminal, the other 5 to 10 mm. below; rachis capillary, minutely pubescent or scabrous, pubescent at base; spikelets 4 to 8, 3 mm. long, secund in a single row, the pedicels slender, about 1 mm. long, the cup or joint dark-colored; glume and sterile lemma about

[a] Tabl. Encycl. **1:** 176. 1791.

equal, ovate-acuminate, pilose with appressed hairs, sterile lemma empty; fertile lemma oval, glabrous, 1.5 mm. long, tipped with a slender scabrous awn about 1 mm. long.

Jata Hills near Guanabacoa, *Hitchcock*, March 15, 1906, no. 559392 in the U. S. National Herbarium (type).

2. **Eriochloa punctata** (L.) Hamilt. Prod. Fl. Ind. Occ. 5. 1825.
Milium punctatum L. Syst. ed. 10. **2:** 872. 1759.
Wright 1542; Yumary Mountains, *Rugel* 889 in Herb. N. Y. Bot. Gard.

There are two specimens of this species in the Grisebach Herbarium, both from eastern Cuba, one collected in 1859, marked 1542, the other in 1860, with the secondary number 95. In the Gray Herbarium there are also two sheets of the same, one collected near Monte Verde, eastern Cuba, in 1859, "River bank Saltadero, Sept. 11," the other from "Sand bars of the Baracoa near N. Sophie, Sept. 11," 1860–1864.

3. **Eriochloa ramosa** (Retz.) Kuntze, Rev. Gen. Pl. **2:** 775. 1891.
Milium ramosum Retz. Obs. **6:** 22. 1791.
Paspalus annulatus Flügge, Mon. Pasp. 133. 1810.
Eriochloa annulata Kunth, Rev. Gram. **1:** 30. 1829.
Wright 3886.

This agrees with Asiatic specimens and may be introduced. It differs from *E. punctata* in the narrower blades and the shorter awn to the fruit.

Allied to these is the Porto Rican **Eriochloa subglabra** (Nash). (*Monachne subglabra* Nash, Bull. Torr. Club **30:** 374. 1903; *Eriochloa punctata subglabra* Urban, Symb. Antill. **4:** 85. 1903). This species differs from *E. ramosa* in the broader blades and pronouncedly velvety nodes, and in habit; from *E. punctata* in the mucronate, instead of slender-awned, fertile lemma, and from both in having a staminate flower in the axil of the sterile lemma. Urban reduced this to a variety of *E. punctata* without having seen the plant.

23. ISACHNE R. Br. Prod. 196. 1810.

1. **Isachne leersioides** Griseb. Mem. Amer. Acad. n. ser. **8:** 533. 1862.
Wright 755 in National Herbarium (1547 in Sauvalle Herbarium).

Number 755 in the Sauvalle Herbarium is *Panicum exiguiflorum*. In the Grisebach Herbarium there are two specimens of *Isachne leersioides* collected by Wright in eastern Cuba—one in 1859, numbered 755, and one in 1860, numbered 102. In the Gray Herbarium there are three specimens bearing the number 755. One is *P. exiguiflorum;* the other two are *Isachne leersioides*, both from eastern Cuba—one in 1856–57, the other from Monte Verde in 1859. *Isachne leersioides* is listed in Sauvalle's Flora Cubana as no. 1547.

24. SYNTHERISMA Walt. Fl. Car. 76. 1788.

Rachis of racemes wing-angled.
  Spikelets 3 to 4 mm. long, more or less villous on nerves; rachis not pilose.....4. *S. sanguinalis.*
  Spikelets 2 mm. long, glabrous; rachis sparsely long-pilose.....1. *S. digitata.*
Rachis of racemes angled but scarcely winged.
  Spikelets about 3 mm. long, nearly glabrous.....5. *S. simpsoni.*
  Spikelets 1. 5 to 2.5 mm. long, usually villous-ciliate.
    Racemes usually less than 10 cm. long; spikelets 1.5 mm. long.....2. *S. filiformis.*
    Racemes usually more than 10 cm. long; spikelets 2 to 2.5 mm. long.

Blades much elongated, mostly 30 to 40 cm. long, nearly glabrous; spikelets about 2.5 mm. long.....3. *S. leucocoma.*
Blades shorter, mostly 10 to 20 cm. long, woolly-villous; spikelets about 2 mm. long.....6. *S. villosa.*

1. **Syntherisma digitata** (Sw.) Hitchc. Contr. Nat. Herb. **12:** 142. 1908.
Milium digitatum Sw. Prod. 24. 1788.
Digitaria setosa Desv.; Hamilt. Prod. Fl. Ind. Occ. 6. 1825.
Syntherisma setosa Nash, Bull. Torr. Club **25:** 300. 1898.
Wright 764 in part; Herradura, *Tracy* 9049, *Hitchcock* in 1906; Isle of Pines, *Curtiss* in 1904 in Herb. N. Y. Bot. Gard.

In the Grisebach Herbarium are two Wright specimens, no. 177 of 1865, "Bushy savannas, Hanabana, May 29," and no. 764 from eastern Cuba, 1856–57. Wright's 764 from eastern Cuba in 1856–57 in the Gray Herbarium is a mixture of *S. digitata* and *S. sanguinalis;* no. 764 of 1865 is the latter species only.

2. **Syntherisma filiformis** (L.) Nash, Bull. Torr. Club **22:** 420. 1895.
Panicum filiforme L. Sp. Pl. 57. 1753.
Panicum curvinerve Hack. Oesterr. Bot. Zeitschr. **51:** 335. 1901.
Wright 1544 in part.

The specimen of Wright's 1544 in the National Herbarium labeled, "Sandy pine woods, Pinar del Rio, Sept.," is partly this and partly *S. leucocoma* Nash. Hackel[a] bases his *P. curvinerve* upon this portion of *Wright* 1544. The characters which he mentions, such as the smooth glumes with incurving nerves, are found not infrequently among specimens of *S. filiformis* from the northern United States, whence the type was collected by Kalm. In the specimen of 1544 in the National Herbarium (the smaller portion with spikelets only 1.5 mm. long) part of the panicles have nearly glabrous spikelets, and part have long-pubescent spikelets. This differs distinctly from the other part of *Wright* 1544, which Hackel may have taken for the true *S. filiformis.* The amount of pubescence upon the spikelet is quite variable in this species as in others of this genus. The size of the spikelets, however, is fairly constant. In the Grisebach Herbarium there are two specimens of this from eastern Cuba, one collected in 1859 numbered 1544, the other in 1860 numbered "107=1544."

3. **Syntherisma leucocoma** Nash, Bull. Torr. Club **25:** 295. 1898.
Sandy pine woods in large tufts, Pinar del Rio, September, *Wright* 1544, in part; Herradura, *Hitchcock* in 1906.

Spikelets 2.5 mm. long; plants mostly glabrous or nearly so, tall, with elongated narrow blades and slender erect racemes as much as 25 cm. long.

4. **Syntherisma sanguinalis** (L.) Dulac, Fl. Haut. Pyr. 77. 1867.
Panicum sanguinale L. Sp. Pl. 57. 1753.
Asperella digitaria Lam. Tabl. Encycl. **1:** 167. 1791.

La Fermina, June 17, *Wright* 3883; *Wright* 764 in part; Habana, *Curtiss* 655, *Hitchcock* in 1906, *Leon* 301, 304; Santiago de las Vegas, *Hitchcock* in 1906, *Baker* HC 501; Puentes Grandes, *Leon* 279; Guanabacoa, *Hitchcock* in 1906; Batabano, *Hitchcock* in 1906; Cienfuegos, *Pringle* 46 in the Gray Herbarium; Guines, *Leon* 304. The following are in the herbarium of the New York Botanical Garden: Santiago de Cuba, *Taylor* 50; Isle of Pines, *Curtiss* in 1904; Rincon, *Britton & Wilson* 485; Matanzas, *Britton & Shafer* 333; Bayamese, *Eggers* 4690.

The sheet of 764 in the National Herbarium, like that in the Sauvalle Herbarium, consists of a mixture of this species and *S. digitata.* In the latter herbarium this number has two labels, one "Savannas, S. Cristobal, Aug.," the other "Sandy pine woods, Pinar del Rio, Sept." No. 764 in the National Herbarium has the label,

[a] Loc. cit.

"Savannas, Retiro, July." In the Grisebach Herbarium there are two specimens from Wright. One collected in 1865 and numbered 178, and 294 ("var. eriogona"); the other without number, labeled "Roads and fields, common, Hanabana, May 21."

Lamarck's type, labeled "Asperella digitaria lam. ill. ex. D. Richard," is in the Lamarck Herbarium in the Museum at Paris.

5. **Syntherisma simpsoni** (Vasey) Nash, Bull. Torr. Club **25:** 297. 1898.
Panicum sanguinale simpsoni Vasey, Contr. Nat. Herb. **3:** 25. 1892.
Isle of Pines, *Curtiss* 521.

Spikelets glabrous, 2.5 mm. long, the glume and sterile lemma equal and slightly exceeding the fruit. **Syntherisma aequiglumis** (Hack. & Arech.) (*Panicum aequiglume* Hack. & Arech. in Arech. Gram. Urug. 93. 1894) differs in having larger spikelets, 3.5 mm. long, the acuminate sparsely pubescent glume and sterile lemma exceeding the fruit by 0.5 mm.

6. **Syntherisma villosa** Walt. Fl. Car. 77. 1788.
Sandy pinales, La Grifa la Catolina, Pinar del Rio, January, *Wright* 3884; Herradura, *Tracy* 9077, 9104.

There are two specimens in the Grisebach Herbarium, one marked "Edge of woods, bushy savannas, Hanabana, May 30," 1865, numbered 173, the other, "Bushy savannas, Hanabana, May 27," 1865. Spikelets about 2 mm. long; plant pubescent or nearly glabrous.

25. VALOTA Adans. Fam. Pl. **2:** 495. 1763.

1. **Valota insularis** (L.) Chase, Proc. Biol. Soc. Wash. **19:** 188. 1906.
Andropogon insulare L. Syst. Nat. ed. 10. **2:** 1304. 1759.
Panicum leucophaeum H. B. K. Nov. Gen. & Sp. **1:** 87. 1816.
Panicum duchaissingii Steud. Syn. Pl. Glum. **1:** 93. 1854.

Santiago de las Vegas, *Baker* HC 602, 1473, *Hitchcock* in 1906; Vento, *Schafer* in 1903; Triscornia, *Tracy* 9083; Herradura, *Tracy* 9050; San Luis, *Pollard & Palmer* 350; Matanzas, *Rugel* 191 in Gray Herbarium; Cienfuegos, *Pringle* 44 and *Combs* 255 in Gray Herbarium; Marianao, *Leon* 306. The following are in the herbarium of the New York Botanical Garden: Santiago de Cuba, *Hamilton* 216, 217, *Underwood & Earle* 165; Matanzas, *Britton & Shafer* 165, *Britton & Wilson* 101; Cedro, *Underwood & Earle* 1536.

In the Grisebach Herbarium is a Wright specimen from eastern Cuba, 1859, numbered 1541.

Steudel's type from "Ins. Guadaloupe Duchaissing" is in the Museum at Paris.

26. ALLOTEROPSIS Presl, Rel. Haenk. 343. *pl. 47.* 1830.[a]

Blades elongated, 30 to 40 cm. long; racemes several in a cluster. 2. *A. dura.*
Blades mostly radical, 10 to 15 cm. long; racemes 1 or 2 ..... 1. *A. amphistemon.*

[a] The type species is *A. distachya* Presl (op. cit. 344), which is published as coming from Monterey, California, but the type in the National Museum at Prague has two labels, "Peruana montana," and "Regio montana Luzon?" The plant is **Alloteropsis semialata** (R. Br.); *Panicum semialatum* R. Br. Prod. 192. 1810, the type of which is from New Holland. This is not an American species and Presl's type must have come from the Philippines, as indicated by Scribner (Rep. Mo. Bot. Gard. **10:** 37. 1899). Presl's plate and description are incorrect in that the artist incorporated in the drawing of the spikelet of Alloteropsis a spikelet of an Andropogon which had become wedged between the glumes and this is described as a second pair of spikelets. Although Presl's genus is founded upon a misconception there is no doubt as to the identity of the type species. Hence Alloteropsis, the oldest name for this group as segregated from Panicum, is accepted for the genus.

1. **Alloteropsis amphistemon** (Wright).

Panicum amphistemon Wright, Anal. Acad. Cienc. Habana **8**: 207. 1871; Sauv. Fl. Cub. 198.

Wright 3464.

The type of *Panicum amphistemon* Wright is in the Gray Herbarium, *Wright* 3464, labeled "Mayarí-abajo, Aug. 2. in small dense tufts."

2. **Alloteropsis dura** (Griseb.).

Panicum durum Griseb. Mem. Amer. Acad. n. ser. **8**: 533. 1862.

Rocky hills, procumbent in loose tufts, Valestina, September 25, *Wright* 3868; in small tufts on steep hills at the Farallones, N. Sophie, September 29, *Wright* 1539 in the Gray Herbarium.

In the Grisebach Herbarium is the type of *P. durum*, *Wright* 1559 from eastern Cuba in 1859.

27. **MESOSETUM** Steud. Syn. Pl. Glum. **1**: 118. 1854.[a]

Spikelets copiously villous-ciliate ..... 1. *M. rottboellioides.*
Spikelets glabrous or somewhat hispid ..... 2. *M. urightii.*

1. **Mesosetum rottboelliodes** (H. B. K.).

Panicum rottboellioides H. B. K. Nov. Gen. & Sp. **1**: 96. 1816.

Mesosetum cayennense Steud. Syn. Pl. Glum. **1**: 118. 1854.

Culms scattered, single or few, savannas, Matatoso, August, *Wright* 3449; Herradura, *Baker* HC 2935, *Tracy* 9058, *Hitchcock* in 1906; Isle of Pines, *Curtiss* 396, *Palmer & Riley* 889, 896, *Taylor* 31; Cienfuegos, *Combs* 401 in Gray Herbarium; Sagua, *Britton & Wilson* 336 in Herb. N. Y. Bot. Gard.

The Sauvalle specimen has a second label which reads, "In small tufts, Pinales, Daganiguas, Almacigos Consolacion, Sept." The Grisebach specimen from western Cuba, 1863, is numbered "894=3449." *Wright* 3449 in the Gray Herbarium is from "Savannas, Vueltabajo, July 24."

2. **Mesosetum wrightii** sp. nov.

Culms ascending from a geniculate, rooting or creeping base, slender, glabrous, 20 to 40 cm. long; nodes appressed-hispid; sheaths glabrous below, hispid toward the summit, or the lower hispid throughout, ciliate on the margin; ligule of short bristles; blades flat or somewhat involute on the margins, stiff and thick, yellow-green, hispid below and sparsely so above, remotely papillose-ciliate on the cartilaginous margins, 3 to 6 cm. long, 2 to 3 mm. wide, the uppermost much reduced; spike single, terminating the culm, mostly long-exserted, 2 to 3 cm. long; spikelets subsessile, appressed to the rachis, alternate, 3 to 4 mm. long, the apex of one about reaching the base of the one above on the same side; first glume glabrous, 3-nerved, narrow, acuminate to a blunt point, a little shorter than the second, placed next to the rachis; second glume hispid at the base with a tuft of hairs, sparsely or copiously hispid above, strongly 5-nerved and with some additional striæ, narrowed to a blunt apex; sterile lemma similar, somewhat gibbous below, 7-nerved, its palea obsolete; fertile lemma chartaceous, smooth, and shining, rounded on the back so as to be as thick as wide, about 2 mm. long, extended into a short point, the margins flat, not inrolled; palea similar and included in the margins of the lemma.

Type specimen from Cuba, *Wright* 3859 no. 559961 in the U. S. National Herbarium. The fragmentary specimen in the Sauvalle Herbarium bears the label

[a] Mesosetum Steud. Flora **33**: 228. 1850, nomen nudum. The type species of Mesosetum is *M. cayennense* Steud., "Leprieur legit. in Cayenne," the type specimen of which, in the herbarium of the Museum at Paris, belongs to the same species as that of *Panicum rottboellioides* H. B. K. in the same herbarium.

"Pinales, Daganiguas, Almicigos, Sept." *Panicum sclerochloa* Trin.[a] (**Mesosetum sclerochloa** (Trin.)) of Brazil, the type of which is in the Trinius Herbarium, differs in having glabrous blades, spikelets 5 mm. long, somewhat scabrous but not hispid, and glumes and lemmas all notched near the apex, hence somewhat 3-lobed. In Sauvalle's Flora Cubana *Wright* 3859 is doubtfully referred to *Panicum sclerochloa* Trin.

28. BRACHIARIA Griseb. in Ledeb. Fl. Ross. 4: 469. 1853.

1. **Brachiaria plantaginea** (Link).
   Panicum plantagineum Link, Hort. Berol. **1:** 206. 1827.
   Panicum leandri Trin. Icon. 335. 1836.
   Paspalum platyphyllum Griseb. Cat. Pl. Cub. 230. 1866.
   Panicum platyphyllum Munro; Vasey, U. S. Dept. Agr. Div. Bot. Bull. **8:** 25. 1889.
   Brachiaria platyphylla Nash in Small, Fl. Southeast. U. S. 81. 1903.
   Wright 3853, 3441; in dense patches in pasture, Sabinilla, June, *Wright* 3867.

The type of Link's species is in the Berlin Herbarium. Wright's 3853 in the Sauvalle Herbarium bears the secondary number 174. In the Grisebach Herbarium are two specimens, the type of *Paspalum platyphyllum* from western Cuba, 1863, numbered "892=3441" and no. 174 labeled, "Damp places in roads and elsewhere, Zarabanda, May 4." This species is placed in the genus Brachiaria because the spikelets are placed with the first glume toward the rachis.

29. HYMENACHNE Beauv. Agrost. 48. *pl. 10. f. 8.* 1812.

Inflorescence spike-like; spikelets 4 mm. long.....1. *H. amplexicaulis.*
Inflorescence of numerous spikes, 1 to 3 cm. long; spikelets 2 to 3 mm. long.....2. *H. auriculata.*

1. **Hymenachne amplexicaulis** (Rudge) Nees, Agrost. Bras. 276. 1829.
   Panicum amplexicaule Rudge, Pl. Guian. **1:** 21. 1805.
   Panicum hymenachne Desv. Opusc. 82. 1831.
   Panicum myuros of authors, not Lam.[b]
   Wright 3469; Santiago de las Vegas, *Hitchcock* in 1906; Habana, *Leon* 559; Guines, *Leon* 577.

The specimen in the Grisebach Herbarium is from eastern Cuba, 1860, and is numbered "108=3469." No. 3469 in the Gray Herbarium is from "Margin of Rio Bayamo, Oct. 14."

2. **Hymenachne auriculata** (Willd.) Chase, Proc. Biol. Soc. Wash. **21:** 5. 1908.
   Panicum auriculatum Willd.; Spreng. Syst. **1:** 322. 1825.
   Wright 3863 in part.

There are three labels with this specimen in the Sauvalle Herbarium, "In ponds, Daganiguas, Sept.," "Wet margin of lagunas, Sta. Cruz de los Piños, Nov. 10," "Low marshy lands, Guanimar, Nov." On the same sheet is a specimen of *Panicum condensum* Nash, and one of *P. laxum* Sw.

The specimen of Hymenachne is fragmentary, but appears to belong to this species. Wright's 3863 in the National Herbarium is mixed with *Panicum laxum* Sw. Wright's 3863 in the Gray Herbarium is mixed with *P. condensum*.

30. SACCIOLEPIS Nash in Britton, Man. 89. 1901.

Spikelets 4 mm. long, on slender pedicels.....2. *S. striata.*
Spikelets 2 to 3 mm. long, subsessile.

[a] Icon. 283. 1836.

[b] See Proc. Biol. Soc. Wash. **21:** 1. 1908.

Spikelets 2 mm. long, panicle dense.....1. *S. myuros.*
Spikelets 3 mm. long, panicle often interrupted.....3. *S. vilvoides.*

1. **Sacciolepis myuros** (Lam.) Chase, Proc. Biol. Soc. Wash. **21:** 7. 1908.
Panicum myuros Lam. Tabl. Encycl. **1:** 172. 1791.
Isle of Pines, *Curtiss* 428.

2. **Sacciolepis striata** (L.) Nash, Bull. Torr. Club **30:** 383. 1903.
Holcus striatus L. Sp. Pl. 1048. 1753.
Panicum gibbum Ell. Bot. S. C. & Ga. **1:** 116. 1816.
On tembladeros[a] in lagunas, Pinar del Rio, December, *Wright* 3885.
The Grisebach specimen is from Hanabana, May 25, 1865, numbered 198. A specimen in the Gray Herbarium is numbered "302=3885."

3. **Sacciolepis vilvoides** (Trin.) Chase, Proc. Biol. Soc. Wash. **21:** 7. 1908.
Panicum vilvoides Trin. Gram. Pan. 171. 1826.
Hymenachne fluviatilis Nees, Agrost. Bras. 273. 1829.
In rivulets, Pinar del Rio, October, *Wright* 3470; Isle of Pines, *Curtiss* 304.
This species is represented in the Grisebach Herbarium by a Wright specimen from western Cuba, 1863, numbered "944=3470." Wright's 3470 in the Gray Herbarium is labeled, "In lagunas, Los Almacigos, Nov. 23," and "On tembladeros[a] in lagunas, Asiento viejo de San Julian, Nov. 30."

31. **ECHINOCHLOA** Beauv. Agrost. 53. *pl. 11. f. 2.* 1812.

Sheaths hirsute.....3. *E. walteri.*
Sheaths glabrous.
Spikelets pointed but not awned.....1. *E. colona.*
Spikelets awned.....2. *E. crusgalli.*

1. **Echinochloa colona** (L.) Link, Hort. Berol. **2:** 209. 1833.
Panicum colonum L. Syst. Nat. ed. 10. **2:** 870. 1759.
Wright 752; Habana, *Baker* HC 1796, *Leon* 303, *Palmer & Riley* 1137; Santiago de las Vegas, *Baker* HC 502, 4765, *Hitchcock* in 1906; Buena Vista, *Shafer* in 1903; Cerro, *Shafer* 180; Guanabacoa, *Leon* 117 in part; Cabañas, *Palmer & Riley* 756; Cienfuegos, *Pringle* 45; *Combs* 254 in Gray Herbarium; Guines, *Leon* 425. The following are in the herbarium of the New York Botanical Garden: Isle of Pines, *Curtiss* 427; Matanzas, *Britton & Shafer* 509; Cedro, *Underwood & Earle* 1620.
In the Grisebach Herbarium there are two specimens, one from western Cuba, 1863, "946=752," the other numbered 27, collected in 1865.
A specimen in the herbarium of the New York Botanical Garden from Matanzas, *Rugel* 884, is doubtfully referred to *E. colona.* The spikelets have awns 2 to 3 mm. long.

2. **Echinochloa crusgalli** (L.) Beauv. Agrost. 53. 1812.
Panicum crusgalli L. Sp. Pl. 56. 1753.
Santiago, *Linden* 1814 in Leipzig Herbarium; *Rugel* 889 in Grisebach Herbarium; *Wright* in 1865 in Grisebach Herbarium; *Wright* 53 of 1865 in Kew Herbarium; Isle of Pines, *Curtiss* in 1904 in Herb. N. Y. Bot. Gard.; Matanzas, *Britton & Wilson* 175 in Herb. N. Y. Bot. Gard.

3. **Echinochloa walteri** (Pursh) Nash in Britton, Man. 78. 1901.
Panicum walteri Pursh, Fl. Sept. Amer. **1**: 66. 1814.
Low wooded swamps, Hanabana, May 27, *Wright* 3879; *Wright* 160 in Kew Herbarium.

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[a] Quaking bogs.

There are two additional labels with *Wright* 3879 in the Sauvalle Herbarium, "Low marshy savannas, Guanimas, Nov.," and "Margin of mangrove swamp, Trinidad, Mar. 13."

32. PANICUM L. Sp. Pl. 55. 1753.

Axis of the panicle branches extending beyond base of uppermost spikelet as a short point or bristle.....11. *P. distantiflorum.*
Axis of panicle branches not extended into a bristle.
Inflorescence consisting of several spike-like, more or less secund racemes.
Fruit smooth and shining; spikelets not over 1.5 mm. long. (LAXUM GROUP.)
Rachis pilose; pedicel short, subequal.....32. *P. pilosum.*
Rachis not pilose; pedicels unequal, panicle less regular.....23. *P. laxum.*
Fruit transversely wrinkled; spikelets turgid. (REPTANS GROUP.)
Nodes bearded.....29. *P. numidianum.*
Nodes sometimes pubescent, but not bearded.
Glumes and sterile lemma prominently transversely reticulate-veined.....15. *P. fasciculatum.*
Glumes and sterile lemma not cross-veined.
Spikelets hispidulous, pointed, first glume acute.....2. *P. adspersum.*
Spikelets glabrous, first glume truncate.
Blades ovate-lanceolate, 5 to 10 mm. wide, 2 to 7 cm. long; prostrate-spreading.....35. *P. reptans.*
Blades elongated, 10 to 20 cm. long, narrow; flowering culms erect or ascending; inflorescence of numerous erect-appressed racemes on an elongated axis; spikelets in 2 distinct rows.....17. *P. geminatum.*
Inflorescence a more or less diffuse panicle, sometimes narrow and rather compact, but not consisting of spike-like racemes.
Stems woody, resembling bamboos. (DIVARICATUM GROUP.)
Sheaths villous.
Stems tall, blades 1 to 2 cm. wide, not distichous.....42. *P. swartzianum.*
Stems creeping, blades distichous, 2 to 3 cm. long, about 5 mm. wide, velvety.....36. *P. rugelii.*
Sheaths smooth or pubescent only.
Panicle compact; blades ovate-lanceolate, 1.5 to 4 cm. wide, velvety-puberulent beneath; spikelets globular.....8. *P. compactum.*
Panicle open, blades lanceolate.
Stem creeping, sending up erect flowering culms.....19. *P. grisebachii.*
Stem climbing or trailing.
Panicle large and spreading, 10 to 20 cm. long; blades 1.5 to 2.5 cm. wide.....39. *P. sloanei.*

Panicle small and few-flowered, usually about 5 cm. long; blades usually 5 to 8 mm. wide.....12. *P. divaricatum.*

Stems herbaceous.

Fruit transversely rugose.....25. *P. maximum.*

Fruit smooth. (See continuation 1.)

(Continuation 1.)

Plants forming a rosette of basal leaves in autumn; early culms simple, with terminal, exserted, many-flowered, spreading panicles; freely branching after maturity of primary panicle, and bearing numerous reduced panicles more or less included in the sheaths. (DICHOTOMUM GROUP.)

Ligule a ring of hairs, 1 mm. or more long; spikelets pubescent, 1 to 1.5 mm. long.

Spikelets hardly 1 mm. long; foliage minutely pubescent, not velvety.....48. *P. wrightianum.*

Spikelets 1.5 mm. long.

Foliage smooth or minutely puberulent.....24. *P. leucothrix.*

Foliage velvety.....1. *P. acuminatum.*

Ligule inconspicuous.

Autumnal state a flat mat or rosette of soft leaves; blades ciliate; spikelets 1.5 to 2 mm. long, glabrous.

Blades pilose on the surface.....41. *P. strigosum.*

Blades glabrous on the surface.....33. *P. polycaulon.*

Autumnal state erect or spreading.

Sheaths velvety or pilose.

Vernal culms 1 meter or more tall, a viscid ring below each node; primary panicles 10 to 20 cm. long; autumnal blades, 5 mm. or more wide.....37. *P. scoparium.*

Vernal culms 20 to 40 cm. tall; primary panicles 2 to 6 cm. long; autumnal blades 1 to 2 mm. wide.....6. *P. chrysopsidifolium.*

Sheaths not velvety nor pilose.

Culms wiry, minutely crisp-puberulent; spikelets pyriform-turgid.

Spikelets 1.5 mm. long.....31. *P. paucicilatum.*

Spikelets 2 mm. long.....22. *P. lancearium.*

Culms glabrous, or only lowermost internodes pubescent.

Spikelets glabrous, 1.6 mm. long.....7. *P. caerulescens.*

Spikelets pubescent.

Nodes bearded; spikelets 2 mm. long.....28. *P. nitidum.*

Nodes glabrous or pubescent, not bearded.

Blades long and narrow, autumnal blades involute; spikelets papillose.

Spikelets 2 mm. long, blunt.....27. *P. neuranthum.*

Spikelets about 3.5 mm. long, pointed.....16. *P. fusiforme.*

Blades not elongated, autumnal blades flat; spikelets not papillose.

Blades with a white-cartilaginous margin, not ciliate; spikelets 1.5 mm. long ..... 44. *P. tenue.*
Blades without white margin, ciliate toward the cordate base; spikelets scarcely over 1 mm. long, suborbicular ..... 13. *P. erectifolium.*

Plants not forming winter rosettes.
Panicles narrow and compact with appressed branches; spikelets glabrous, 1 to 2.5 mm. long.
Culms 1 meter or more tall, compressed at base; panicle 10 to 20 cm. long; spikelets 2.5 mm. long ..... 9. *P. condensum.*
Culms 60 cm. or less tall, stiff and wiry, base not compressed; panicle less than 5 cm. long; spikelets 1 to 2 mm. long.
Spikelets scarcely more than 1 mm. long ..... 40. *P. stenodes.*
Spikelets 2 mm. long: ..... 43. *P. tenerum.*
Panicles open, usually diffusely spreading.
Panicle branches in several distinct distant whorls; spikelets short-pediceled, remote along the branches ..... 26. *P. megiston.*
Panicle branches not in distinct whorls.
Spikelets 5 to 6 mm. long, pedicels short and stout; panicle branches few, ascending ..... 49. *P. zizanioides.*
Spikelets less than 5 mm. long, pedicels slender, often capillary.
Plants producing scaly rootstocks.
Blades 5 to 15 cm. long; culms less than 50 cm. tall; a sea-shore grass ..... 34. *P. repens.*
Blades elongated, 20 to 40 cm. long; culms 1 meter or more tall ..... 47. *P. virgatum cubense.*
Plants not producing rootstocks, but culms sometimes decumbent and rooting at base.
Spikelets glutinous, 3 mm. long ..... 18. *P. glutinosum.*
Spikelets not glutinous. (See continuation 2.)

(Continuation 2.)
Spikelets warty-rugose, about 2 mm. long; blades ovate-lanceolate ..... 38. *P. sellovii.*
Spikelets not rugose.
Spikelets pubescent, minute (1 mm. long); blades ovate-lanceolate ..... 46. *P. trichoides.*
Spikelets glabrous.
Spikelets 1.5 mm. long, short-pediceled on the spreading branches of a panicle 2 to 5 cm. long; culms slender, 30 to 50 cm. high, blades 1 to 2 mm. wide. 14. *P. exiguiflorum.*
Spikelets on more or less elongated pedicels.
Culms slender, widely decumbent-spreading; blades elliptic-lanceolate, 1 to 3 cm. long, glaucous ..... 30. *P. parvifolium.*

Culms not slender nor decumbent-spreading.
  First glume obtuse or truncate, one-fourth the length of the acuminate spikelet..... 5. *P. chloroticum.*
  First glume acute to acuminate, more than one-third the length of the spikelet.
    Sheaths glabrous.
      Panicle very diffuse, the branches capillary; spikelets less than 1.5 mm. long.....45. *P. tricanthum.*
      Panicle scarcely diffuse, the branches not capillary; spikelets 2 mm. or more long.
        Culms slender; spikelets 2 mm. long .....10. *P. diffusum.*
        Culms tall and stout, 5 to 10 mm. in diameter; spikelets acuminate, about 5 mm. long ..... 3. *P. aquaticum.*
    Sheaths hispid.
      Annual; panicle branches divaricate ..... 4. *P. cayennense.*
      Perennial; panicle branches ascending.
        Spikelets 2 mm. long, panicle compact .....20. *P. hirsutum.*
        Spikelets 3 mm. long, panicle loose .....21. *P. hirtivaginum.*

1. **Panicum acuminatum** Sw. Prod. 23. 1788.

Panicum comophyllum Nash, Bull. Torr. Club **30:** 380. 1903.

Dry savannas, San Cristobal, August, *Wright* 3874; Herradura, *Baker & Dimmock* HC 4871, *Tracy* 9078, *Hitchcock* in 1906; Pinar del Rio, *Shafer* 320 in part, *Palmer & Riley* 447; Isle of Pines, *Curtiss* 328, 307, *Taylor* in 1901, *Palmer & Riley* 989, 1065, 1083, *Taylor* 33 in Herb. N. Y. Bot. Gard.

The type of *P. acuminatum* at Stockholm is a specimen in the autumnal state. Wright's 3874 in the Gray Herbarium is labeled "Low savannas, Chirigote, Nov. 2." Another specimen in the Gray Herbarium, without number, is from "Savannas, Pueblo Nuevo, San Cristobal, May 16."

2. **Panicum adspersum** Trin. Gram. Pan. 146. 1826.

Wright 3869; Santiago de las Vegas, *Baker* HC 387, 512, 1050, 1825, 2057, *Hitchcock* in 1906, *Tracy* 9109; Triscornia, *Hitchcock* in 1906; Habana, *Curtiss* 748, *Leon* 291, 570; Herradura, *Tracy* 9102; Cabañas, *Palmer & Riley* 746, 771; Matanzas, *Britton, Britton & Shafer* 596. In the Herbarium of the New York Botanical Garden are the following: Isle of Pines, *Curtiss* in 1904; Pinar del Rio, *Shafer* 504.

Wright's specimen in the Sauvalle Herbarium bears the secondary number 304 in addition to the distribution number. Grisebach's specimen bears the secondary number 304 (1865). The specimen in the Gray Herbarium bears the secondary number 269. Trinius's type is from Santo Domingo, sent by Sprengel, and is the plant from which the plate is drawn.[a] The spikelets are about 3 mm. long and sparsely hispidulous. The culms are geniculate and rooting below; the blades spreading and 4 to 8 cm. long. A larger form occurs in Florida, with culms as much as 1 meter high, and blades 15 cm. long and 1.5 cm. wide, the spikelets larger, as much as 4 mm. long. This is represented in Cuba by *Curtiss* 748 and *Palmer & Riley* 771. An examination of considerable material from the West Indies and Flor-

[a] Icon. 169.

ida shows that there are all gradations between these extremes, and there appears to be no constant character by which to separate the larger form as a species or even as a well-marked variety.

3. **Panicum aquaticum** Poir. Encycl. Suppl. **4**: 281. 1816.
Panicum elephantipes Nees, Agrost. Bras. 165. 1829.
San Antonio, *Hitchcock* in 1906, Habana, *Leon* 335.
Poiret's type labeled "Panicum aquaticum enc. suppl. * * * Porto Ricco. h. Poiret" is in the herbarium of Cosson in Paris. Nees's type at Munich agrees with this.

4. **Panicum cayennense** Lam. Tabl. Encycl. **1:** 173. 1791.
Among other tall grasses in low grounds, pinales, Pinar del Rio, September, *Wright* 3865; Herradura, *Tracy* 9073; Isle of Pines, *Curtiss* 267, *Palmer & Riley* 1086, *Taylor* 34.
The Grisebach specimen is from western Cuba, 1863, no. 891. A specimen of this species in the Gray Herbarium, without number, is from "Savannas, Vueltabajo, July 28."

5. **Panicum chloroticum** Nees, Agrost. Bras. 164. 1829.
Punta Brava, *Baker* HC 4054; Santiago de las Vegas, *Hitchcock* in 1906; Batabano, *Hitchcock* in 1906; Herradura, *Hitchcock* in 1906, *Tracy* 9055; *Wright* 3456 and 3860 in National Herbarium in part; *Wright* 3860 in Sauvalle Herbarium; *Wright* 181, 189 in the Grisebach Herbarium; *Wright* 3456 in Sauvalle Herbarium; edge of Lagunas, Pinar del Rio, September, *Wright* 3861.
The first two specimens cited above are like the type at Munich; the others are more or less pubescent, but appear to be otherwise the same. The type of *Panicum proliferum pilosum* Griseb. in the Grisebach Herbarium is labeled "Around lagunas in wet or damp ground, Hanabana, May 16," no. 186. This is the same as *Wright* 3860 in the Sauvalle Herbarium. Probably *P. bartowense* Scribn. & Merr.[a] is a form of *P. chloroticum*. It differs from the Brazilian specimen only in its hispid sheaths and from some of the hispid Cuban specimens only in its larger size. Nash's 567 from Eustis, Florida, is a low spreading form, with culm about 30 cm. long, but the blades and sheaths pubescent like *P. bartowense*. *P. dichotomiflorum* Michx.[b] (*P. proliferum* of American authors, not Lam.), common throughout the eastern United States, is smooth throughout, and is usually more or less geniculate-spreading at base, and the blades are usually long and gradually acuminate. In Florida this shows a tendency to become pubescent. *Combs & Rolfs* 94 from Lake City, Florida, has the habit of *P. dichotomiflorum*, but the blades are pubescent on the upper surface. The spikelets of *P. dichotomiflorum* vary in length from 2 to 3 mm. It would appear that there is one variable species, including *P. dichotomiflorum* Michx., *P. chloroticum* Nees, and *P. bartowense* Scribn. & Merr. The West Indian specimens resemble more closely *P. chloroticum* in habit, and for the present they are referred to this species. Other specimens of the same in the National Herbarium are: Bahamas, Nassau, *Curtiss* 177; Cat Cay, *Brace* 3742. Bermuda: Hamilton, *Millspaugh* 126. Porto Rico: Unado, *Britton & Cowell* 432. South America: Brazil, *Riedel* 959, *Salzmann* (*P. hygrophilum* Salzm.); Paraguay, *Morong* 1002; Uruguay, *Arechavaleta*.
Wright's 3456 and 3861 cited above have larger spikelets than the other Cuban specimens (3 mm. long), but this appears to be a variable character. *Wright* 3456 is the type of *P. proliferum strictum* Griseb.[c] *Wright* 3456 in the Gray Herbarium is from "Lagunas, Almacigos, Nov. 23."

6. **Panicum chrysopsidifolium** Nash in Small, Fl. Southeast. U. S. 100. 1903.
Wright 3453 in part; *Wright* 3454 in part; *Wright* 3461 in part; Herradura, *Hitchcock* in 1906; Consolacion del Sur, *Palmer & Riley* 481; Isle of Pines, *Palmer & Riley* 982.

[a] U. S. Dept. Agr. Div. Agrost. Circ. **35**: 3. 1901.
[b] Fl. Bor. Amer. **1**: 48. 1803.
[c] Cat. Pl. Cub. 232. 1866.

The Grisebach specimen of *Wright* 3461 also belongs to this species, though it is listed by him under *P. dichotomum* variety *nodiflorum*. Another specimen of this was included by Grisebach under *P. neuranthum;* it is labeled "α forma ascendens ramosa." Wright's 3461 in the Gray Herbarium is part *P. chrysopsidifolium* and part *P. lancearium*. The two labels are, "Sandy pinales, Asiento Viejo de San Julian, Dec. 1," and "Pinal. Mayarí, July 24."

This species is distinguished from *P. neuranthum* by the pubescent culms, bearded nodes, spreading vernal panicles, and short, flat autumnal blades on zigzag stems. The spikelets are 2 mm. long. It occurs in Florida and in Porto Rico (*Heller* 982).

7. **Panicum caerulescens** Hack. in herb.

Vernal form cespitose, of a somewhat glaucous bluish green color; culms erect or ascending, 40 to 75 cm. high, glabrous; sheaths usually less than half as long as the internodes, glabrous or the basal ones sparingly pubescent; blades ascending or spreading, commonly purplish beneath, glabrous or rarely a few hairs around the base, 5 to 8 cm. long, 4 to 7 mm. wide, the margins nearly parallel for two-thirds their length; panicles usually short-exserted, 3 to 7 mm. long, one-half as wide or less, the branches narrowly ascending; spikelets 1.5 to 1.6 mm. long, 0.9 mm. wide, obovoid, blunt, very turgid, glabrous, first glume about one-third the length of the spikelet; second glume and sterile lemma subequal, the glume scarcely as long as the fruit at maturity; fruit 1.4 mm. long, 0.8 mm. wide, ellipsoid.

Autumnal form erect or leaning, sometimes decumbent at base, producing short, densely fascicled branches at the middle and upper nodes, these tufts scarcely as long as the primary internodes, the reduced blades ascending, more or less involute; the reduced panicles with only a lew long-pediceled spikelets.

Closely related to *P. roanokense*, a species of the southern Atlantic coastal plain of the United States, from which it is distinguished by the narrow panicles and smaller spikelets and by the tufted branches of the autumnal form.

The type is *Hitchcock* 706, "In glade among Spartina, etc., stretching up through the tall grass, Miami, Florida, April 3, 1906;" U. S. National Herbarium no. 558380. The name refers to the glaucous blue color.

In marshes and swampy woods, southern Alabama and Florida, Cuba, and the Bahamas.

Wright 3463 in part; Santa Clara, *Britton & Wilson* 316 in Herb. N. Y. Bot. Gard.

Wright's 3463 in the National Herbarium and in the Krug and Urban Herbarium is this species. For other species distributed as 3463, see *P. leucothrix*, *P. wrightianum*, and *P. tenue*.

Bahamas, New Providence, "in fruticetis procumbens," *Eggers* 4305.

8. **Panicum compactum** Sw. Adnot. Bot. 14. 1829.

Eastern Cuba, 1856–57, *Wright* 749; Isle of Pines, *Curtiss* 291, 520, *Palmer & Riley* 904.

This species is distinguished by its broad, usually puberulent blades and compact panicle.

9. **Panicum condensum** Nash in Small, Fl. Southeast. U. S. 93. 1903.

Low savannas, Hanabana, May 19, *Wright* 3862 in part.

In the Grisebach Herbarium there are two specimens of this species. One of them has two labels, "Low wet woods, Hanabana, May 27," no. 184 of 1865, and "Wet—among tall Cyperaceae, in small bunches, Hanabana, May 25." The plant is 3 feet tall, stout, with a compressed base, and narrow compact panicle. The other specimen, which is similar, is labeled, "Palm savannas, Hanabana, May 18," 1865, no. 197. This number of Wright's in the Sauvalle Herbarium and in the National Herbarium is mixed with *P. laxum*. There is a fragment of what appears to be the same, on the sheet of 3863 in the Sauvalle Herbarium. *P. condensum* is common in the southern United States and is found also in the Bahamas (*Curtiss* 174). Wright's 3862 in the

Gray Herbarium consists of *P. condensum* and *P. laxum*. Wright's 3863 in the Gray Herbarium consists of *P. condensum* and *Hymenachne auriculata*.

10. **Panicum diffusum** Sw. Prod. 23. 1788.

Wright 1540; in pastures, Retiro, July, *Wright* 3852; damp savaṇnas, Retiro, October 11, *Wright* 3877; Santiago de las Vegas, *Baker* HC 350, 511, 2052, 2054, *Tracy* 9111, *Wilson* 1405; Habana, *Leon* 190, 305, *Baker, Tracy & Hasselbring* HC 3095; Triscornia, *Tracy* 9082; Guanajay, *Palmer & Riley* 802; Isle of Pines, *Curtiss* 384, 494. The following are in the Herbarium of the New York Botanical Garden: Santiago de las Vegas, *Van Hermann* 2444; Sagua, *Britton & Wilson* 314; Madruga, *Britton & Shafer* 649; Matanzas, *Rugel* 907.

A sheet in the National Herbarium of *Wright* 3860 and another marked "Cuba 3860," which appears to be a Wright plant although there is no Wright label, are in part *P. diffusum*. In the Grisebach Herbarium are three specimens marked, respectively, "In the edge of woods and margin of savannas, Hanabana, May 29," 1865, with the secondary number 191; no. 1540 from eastern Cuba, 1859; and "edge of savannas, Hanabana, May 19," in 1865, with the secondary number 190. Wright's 3877 in the Sauvalle Herbarium and in the Torrey Herbarium is part *P. exiguiflorum*.

11. **Panicum distantiflorum** Rich. in Sagra, Hist. Cub. **11:** 304. 1850.

Panicum utawanaeanum Scribn. in Millsp. Field Columb. Mus. Bot. **2:** 25. 1900.

Panicum sintenisii Nash, Bull. Torr. Club **30 :** 382. 1903.

Wright 3452; Cojimar, *Baker* HC 267, 2902, *Hitchcock* in 1906; Triscornia, *Tracy* 9089, *Hitchcock* in 1906; Matanzas, *Rugel* 190 in Gray Herbarium, 874 in Herb. N. Y. Bot. Gard.

Grisebach's specimen from eastern Cuba, 1860, is numbered "104=3452." Another specimen, included by Grisebach under *Panicum stenodes*, is labeled, "Bushy savannas, Hanabana, May 16, in small tufts," no. 285. A third specimen, "Savannas of Guamaroca, July 25," no. 284, is also included under *P. stenodes*. A part of *Wright* 3870 in the National Herbarium belongs to this species. The type of Richard's species in the herbarium of the Museum at Paris agrees with Scribner's type from Guanica, Porto Rico,[a] a part of which is in the National Herbarium. Nash's description applies to these specimens and his type (*Sintenis* 3463) was also collected at Guanica, Porto Rico. Sintenis's 3365 and 3416, from Guanica, Porto Rico, also belong to this species.

12. **Panicum divaricatum** L. Syst. Nat. ed. 10. **2:** 871. 1759.

Panicum bambusoides Hamilt. Prod. Ind. Occ. 10. 1826.

Panicum chauvinii Steud. Syn. Pl. Glum. **1:** 68. 1854.

Hillsides, scandent or ascending, Valestina, September 19, *Wright* 748; *Wright* 747; Guanajay, *Baker* HC 4269, El Cangre, *Baker* HC 5198; Cojimar, *Baker* HC 5324, La Magdalena, *Baker* HC 2501, 4611; Habana, *Baker* HC 1837; Triscornia, *Hitchcock* in 1906; Herradura, *Tracy* 9047, 9044; Santiago de Cuba, *Millspaugh* 1015; Baracoa, *Pollard, Palmer & Palmer* 76; Isle of Pines, *Millspaugh* 1422, *Palmer & Riley* 1001; Cienfuegos, *Combs* 148 in Gray Herbarium. In the herbarium of the New York Botanical Garden are the following: Managua, *Baker & Wilson* 304; Santiago de Cuba, *Underwood & Earle* 1642; *Taylor* 327; Matanzas, *Britton & Wilson* 241; Isle of Pines, *Curtiss* in 1904.

Widely clambering over bushes. The two specimens of this in Grisebach's herbarium, called by him *P. divaricatum*, are "Prope villam Monte Verde dictam, Cuba orientalis," no. 747, and another labeled 747*a*. These are both smooth throughout. Besides these there are two specimens with pubescent blades, which Grisebach calls *P. divaricatum* variety *puberulum*.[b] One is labeled "In sylvis densis, Matanzas, Cuba,

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[a] Millspaugh, Plantae Utawanae no. 702.

[b] Griseb. Fl. Brit. W. Ind. 551. 1864.

Rug. 187;" the other is *Wright* 748 from eastern Cuba. The type collected by March in Jamaica is also here. Another specimen (*Wright*, western Cuba in 1863) is marked by Grisebach as *β stenostachyum*. These last two specimens appear to be the ordinary form of *P. divaricatum*. The pubescent form can scarcely be separated even as a variety.

Hamilton's species is based on "*P. bambusoides* Herb. Prof. Desv. Porto Rico." A specimen so marked in the Desvaux Herbarium in the Museum at Paris is *P. divaricatum*. The type of *P. chauvinii* Steud. is also in the Museum at Paris.

13. **Panicum erectifolium** Nash, Bull. Torr. Club **23:** 148. 1896.

Panicum sphaerocarpon floridanum Vasey, U. S. Dept. Agr. Div. Bot. Bull. **8:** 33. 1889, not *P. floridanum* Trin. 1835.

Wright 3462.

The specimen in the Grisebach Herbarium is from western Cuba, 1862, and is numbered "896=3462." The specimen in the Gray Herbarium is labeled "Lagunas, Vueltabajo, July 24."

14. **Panicum exiguiflorum** Griseb. Cat. Pl. Cub. 234. 1866.

Panicum minutiflorum Rich. in Sagra, Hist. Cub. **11:** 305. 1853, not Rasp. 1825.

Panicum tricolor Hack. Oesterr. Bot. Zeitschr. **51:** 370. 1901.

Wright 755, 3450, 3877 in part, 756 in Gray Herbarium; Pinar del Rio, *Earle & Wilson* HC 1550; Herradura, *Tracy* 9075, *Hitchcock* in 1906; La Magdalena *Baker* 1; Isle of Pines, *Taylor* 35. The following are in the Herbarium of the New York Botanical Garden: Isle of Pines, *Taylor* 35, *Curtiss* in 1904; Madruga, *Shafer* 452.

Wright's 3450 in the National Herbarium is labeled "Low savannas, Chirigote, Oct. 26;" the same number in the Gray Herbarium, "Pinales, Almacigos, July 26." The type in the Grisebach Herbarium is labeled "In bushy savannas, Hanabana, May 16," 1865. The type of Richard's species is at Paris. Grisebach has two other specimens of this, one from western Cuba, 1863, numbered "909=3450," which is the type of his *P. laxum* variety *variegatum*,[a] and the other, also from western Cuba, numbered "89=3450." Wright's 755, "Pinales, San Juan de Buena Vista, Nov. 21, 1860–64," and no. 756, from eastern Cuba in 1856–57, both in the Gray Herbarium, are *P. exiguiflorum*.

The type of *Panicum tricolor*, *Eggers* 3978, from Fortune Island, Bahamas, was examined at Hackel's herbarium.

15. **Panicum fasciculatum** Sw. Prod. 22. 1788.

Panicum fuscum Sw. Prod. 23. 1788.

Panicum flavescens Sw. Prod. 23. 1788.

Panicum illinoniense Desv. Opusc. 91. 1831.

Santiago de las Vegas, *Van Hermann* HC 2445, *Baker* HC 2678, 5110, *Wilson* 593; La Magdalena, *Baker* HC 3636; Herradura, *Tracy* 9091; Cienfuegos, *Pringle* 74, 124, *Combs* 252 in Gray Herbarium; *Rugel* 881 in Gray Herbarium; Habana, *Leon* 573. In the herbarium of the New York Botanical Garden are the following: Santiago de Cuba, *Taylor* 28; Baracoa, *Underwood & Earle* 839; Santiago de las Vegas, *Van Hermann* 2698b.

This appears to be a recent introduction into Cuba, where it occurs as a weed. The type specimens of Swartz's three species differ only as to size of panicle.

The specimen in the Grisebach Herbarium is from eastern Cuba in 1859 and is numbered 754. Wright's 754 in Gray Herbarium is from "Roadsides near Saltadero, Aug. 4," Monte Verde, 1859.

The published source of *P. illinoniense* Desv. is "America boreali." The specimen in Desvaux's herbarium in the Museum at Paris, marked with this name in Desvaux's handwriting, is *P. fasciculatum* Sw. The sheet is also marked "hab. Carol." The locality is clearly an error.

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[a] Cat. Pl. Cub. 233. 1866.

16. **Panicum fusiforme** nom. nov.

Panicum neuranthum ramosum Griseb. Cat. Pl. Cub. 232. 1866, not *P. ramosum* L. 1767.

Pine woods, Las Oblas, Pinar del Rio, September, *Wright* 3453 in part; *Wright* 3454 in part; Herradura, *Tracy* 9074, *Hitchcock* in 1906, *Baker & Dimmock* HC 4846, *Caldwell & Baker* 7139; Isle of Pines, *Curtiss* 406.

There has been much confusion in the specimens distributed by Wright unde numbers 3453, 3454, and 3461. The Grisebach specimen of the above species, which is the type of his variety, is labeled "Cuba occ. Wr. 1863, 900=3454." No. 3453 is *P. neuranthum*. As distributed in various herbaria, however, *P. fusiforme* occurs in part of nos. 3453, 3454, and 3461. With these are various mixtures of *P. neuranthum*, *P. pauciciliatum*, and *P. lancearium*.

17. **Panicum geminatum** Forsk. Fl. Aegypt. Arab. 18. 1775.

Panicum paspalodes Pers. Syn. **1:** 81. 1805.

Panicum brizoides Lam. Tab. Encycl. **1:** 170. 1791, not L. 1771.

Wright 761; Santiago de las Vegas, *Hitchcock* in 1906; Batabano, *Hitchcock* in 1906; Cienfuegos, *Combs* 426 in Gray Herbarium; Isle of Pines, *Curtiss* in 1904 in Herb. N. Y. Bot. Gard.

No. 761 of *Wright* in the National Herbarium is labeled "Wet, around ponds, Hanabana, June 5." The Grisebach specimen is from eastern Cuba in 1860 and is labeled "Bunches beside water holes. Palma Sola, July 19. 99=761." Persoon's name is based on *Panicum brizoides* Lam., as he quotes Lamarck's diagnosis and cites his name as synonym. At Florence there is an authentic specimen of this sent by Lamarck, collected in Mauritius by Commerson. The specimen of *Panicum brizoides* in the Linnæan Herbarium is *Echinochloa colona* (L.) Link. Doell[a] takes up *Paspalum appressum* Lam. Tabl. Encycl. 176. 1791, transferring it to Panicum, but this is invalidated by *Panicum appressum* Forsk. Fl. Aegypt. Arab. 20. 1775, and by *P. appressum* Kunth, Enum. **1:** 84. 1833.

18. **Panicum glutinosum** Sw. Prod. 24. 1788.

Panicum obtusiflorum Rich. in Sagra, Hist. Cub. **11:** 305. 1850.

Panicum lindenii Griseb. Cat. Pl. Cub. 233. 1866.

Shady hills, Loma Pelada, December 12, *Wright* 757; *Linden* 2143 in Paris Herbarium. Wright's 757 in the Gray Herbarium is from "La Perla, along roadsides." The Grisebach specimen is from eastern Cuba, no. 757. *P. lindenii* Griseb. is a typonym of *P. obtusiflorum* Rich., both being based on *Linden* 2143, which is in the Paris Herbarium.

19. **Panicum grisebachii** Nash, Bull. Torr. Club **35:** 301. 1908.

Mountain woods, creeping-assurgent, Valestina, October 8, *Wright* 3457; Madruga, *Britton, Britton & Shafer* 758; San Antonio de los Baños, *Baker* HC 2853, *Hitchcock* in 1906; Pinar del Rio, *Baker* HC 3817; Matanzas, *Rugel* 187 in Herb. N. Y. Bot. Gard.

The main stem creeps along the ground, throwing up flowering branches a foot or so high. There are two Wright specimens of this in the Grisebach Herbarium, both from western Cuba, 1863, one numbered "889=3457," the other "941=3457."

20. **Panicum hirsutum** Sw. Fl. Ind. Occ. **1:** 173. 1797.

Wet ground near Matanzas, July 5, *Wright* 297 in 1865 in Grisebach Herbarium.

A large stout grass with hirsute sheaths, glabrous blades, large, rather compact panicle, and spikelets about 2 mm. long, being similar to the type at Stockholm. In the herbarium of the New York Botanical Garden are two other West Indian specimens of this species: Martinique, *Duss* 768; Guadaloupe, *Duss* 3917.

[a] In Mart. Fl. Bras. **2**[2]**:** 184. 1877.

21. **Panicum hirtivaginum** sp. nov.

Culm erect (apparently from a perennial base), ascending-hirsute, 60 to 80 cm. tall, the nodes densely hirsute; sheaths hirsute like the culms; ligule bristly; blades flat, hirsute on both surfaces or glabrescent, scarcely scabrous on the margins, elongated, erect or ascending, as much as 60 cm. long, and 12 mm. wide; panicle diffuse, 20 to 30 cm. long, branches ascending, these and the main axis glabrous or somewhat scabrous; spikelets on pedicels 1 to 3 mm. long, ovate-acuminate, glabrous, about 3 mm. long; lower glume ovate, strongly 5-nerved, somewhat over 1 mm. long; upper glume and sterile lemma equal, strongly 7 and 9-nerved, the palea of the latter delicate, about half as long; fertile lemma chartaceous, smooth, acute, nearly 2 mm. long, inrolled at the margins and including the margins of the palea; fruit brown at maturity.

Type specimen *Wright* 758, Cuba, U. S. National Herbarium no. 559958. Other specimens are: Santiago de las Vegas, *Tracy* 9116; Habana, *Tracy* 9068; *Wright* 3860 in Gray Herbarium; Cienfuegos, *Combs* 259 in Gray Herbarium. In the herbarium of the New York Botanical Garden are: Santiago de Cuba, *Hamilton* 230; Alto Cedro, *Underwood & Earle* 1611; Madruga, *Britton & Shafer* 745; *Eggers* 5406.

Wright's 758 is listed in Sauvalle's Flora Cubana as *P. rudgei* Roem. & Schult., which species apparently does not occur in Cuba. The two specimens of *Wright* 758 in the Sauvalle Herbarium are labeled "In low ground beside rivulets, savannas of Guamaroca, July 25," and "In fields, Retiro, Oct. 11." The Grisebach specimen of this species is numbered 281 and was collected in 1865.

This species differs from *P. hirsutum* Sw. in its smaller culms, hirsute blades, more diffuse panicle, and larger spikelets.

22. **Panicum lancearium** Trin. Clav. Agrost. 234. 1822.

Panicum nashianum Scribn. U. S. Dept. Agr. Div. Agrost. Bull. **7:** 79. 1897.

Wright 3460; *Wright* 3461 in part.

Wright's 3460 and 3461 in part, in the Krug and Urban Herbarium belong to this species. There is a specimen of this in the Grisebach Herbarium from eastern Cuba, numbered "101=3460" and labeled "*Panicum dichotomum* var. *nodiflorum* Lam. forma *glabresc.*" Wright's 3460 in the Gray Herbarium is labeled "Pinal. San Juan de Buenavista, Nov. 21."

23. **Panicum laxum** Sw. Prod. 23. 1788.

Panicum agrostidiforme Lam. Tabl. Encycl. **1:** 172. 1791.

Panicum tenuiculmum Meyer, Prim. Fl. Esseq. **58:** 1818.

Panicum polygonatum Schrad. in Schult. Mant. **2:** 256. 1824.

Panicum diandrum Kunth, Rev. Gram. **2:** 323. 1829.

Panicum ramuliflorum Hochst.; Steud. Syn. Pl. Glum. **1:** 65. 1854.

Wright 759, 3856, 3862 in part, 3863 in part; Santiago de Las Vegas, *Tracy* 9114, *Hitchcock* in 1906; Guanabacoa, *Leon* 190; Las Acostas, *Baker* HC 5240; Province Santa Clara, *Baker* HC 2477, 2482; Isle of Pines, *Palmer & Riley* 1069, *Taylor* 37, *Curtiss* 464; Herradura, *Hitchcock* in 1906, *Tracy* 9059, 9062, 9072, 9099, *Caldwell & Baker* 7136; Pinar del Rio, *Baker* HC 1699; Cienfuegos, *Combs* 321 in Gray Herbarium. The following are in the Herbarium of the New York Botanical Garden: Pinar del Rio, *Shafer* 323; Isle of Pines, *Curtiss* in 1904; Sagua, *Britton & Wilson* 300; Guajay, *Earle & Wilson* 343.

Wright's 759 in National Herbarium is labeled "Savannas, Retiro, Oct. 11." There are four specimens in the Grisebach Herbarium: Western Cuba, collected in 1863, "893=759;" eastern Cuba, 1859, no. 759; "Hanabana, May 22, 1865, 189;" "Wet—among tall Cyperaceae, Hanabana, May 25, 1865, 196." Wright's 3862 in the Gray Herbarium consists of two specimens, one of which is *P. laxum*, the other *P. condensum*. Wright's 759 in the Gray Herbarium has three printed blank labels, for the years 1856–57, 1859, and 1860–64.

The type of *P. agrostidiforme* Lam. was examined at the Lamarck Herbarium in the Museum at Paris; those of *P. polygonatum* Schrad. and *P. diandrum* Kunth at Halle, among specimens loaned to Professor Mez by the Berlin Herbarium. A specimen of *P. tenuiculmum* from Meyer is in the Trinius Herbarium; the type of *P. ramuliflorum* Hochst. ("Pl. *Kappler* surin. nr. 1523") is in the Herbarium at Munich. All these agree with Swartz's type.

24. **Panicum leucothrix** Nash, Bull. Torr. Club **24:** 41. 1897.

Herradura, *Hitchcock* in 1906.

In the Grisebach Herbarium is a specimen of this from western Cuba, 1863, numbered "923=3463." For other species distributed as 3463, see *P. wrightianum*, *P. tenue*, and *P. caerulescens*.

25. **Panicum maximum** Jacq. Coll. **1:** 76. 1786.

Panicum laeve Lam. Tabl. Encycl. **1:** 172. 1791.

Panicum trichocondylum Steud. Syn. Pl. Glum. **1:** 74. 1854.

Santiago de las Vegas, *Wilson* 438, *Baker & Wilson* 682, *Hitchcock* in 1906; Madruga, *Shafer;* Guanabacoa, *Leon* 189; Guanajay, *Palmer & Riley* 816; San Diego de los Baños, *Palmer & Riley* 542, 545; El Guama, *Palmer & Riley* 178; Pinar del Rio, *Wilson* 1770, *Palmer & Riley* 377; Herradura, *Hitchcock* in 1906; Santiago de Cuba, *Pollard, Palmer & Palmer* 283; Cienfuegos, *Combs* 294 in Gray Herbarium; Guines, *Leon* 427. In the Herbarium of the New York Botanical Garden are: Santiago de Cuba, *Underwood & Earle* 162; Matanzas, *Britton & Shafer* 113.

The type of *P. laeve* Lam., labeled "de Ste. Dominique" in the Lamarck Herbarium and that of *P. trichocondylum* Steud., labeled "Ins. Guadaloup. Duchaissing" are in the Museum at Paris.

Cultivated for forage and frequently escaped into waste land.

26. **Panicum megiston** Schult. Mant. **2:** 248. 1824.

Panicum altissimum Meyer, Prim. Fl. Esseq. 63. 1818, not Brous. 1805.

On tembladeros in lagunas, St. Cruz de los Piños, July, *Wright* 3872.

27. **Panicum neuranthum** Griseb. Cat. Pl. Cub. 232. 1866.

Wright 3453 in part.

The type specimen in the Grisebach Herbarium is from eastern Cuba, 1860, numbered "103=3453." The specimen in the Gray Herbarium is labeled, "Cuchillos de Baracoa, June 20." This species is distinguished from others of the Angustifolium group by the smooth culms and nodes, involute blades, and narrow panicles, and by spikelets 2 mm. long. *P. neuranthum* also occurs in southern Florida: Sanibel Island, *Simpson* 298; Braidentown, *Tracy* 6711; Clearwater, *Tracy* 7166; *Rugel* 290; Miami, *Hitchcock* 705, 710; Alligator Harbor, *Tracy* 7176.

28. **Panicum nitidum** Lam. Tabl. Encycl. **1:** 172. 1791.

Panicum subbarbulatum Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Circ. **29:** 9. 1901.

Wright 3459.

The specimen in the Sauvalle Herbarium is fragmentary, but the specimen in the Kew Herbarium is more complete. Wright's 3459 in the Gray Herbarium is partly this and partly *P. parvifolium*.

29. **Panicum numidianum** Lam. Tabl. Encycl. **1:** 172. 1791.

Panicum barbinode Trin. Mem. Acad. Petersb. VI. $\mathbf{3}^2$: 256. 1835.

Panicum equinum Salzm.; Steud. Syn. Pl. Glum. **1:** 67. 1854.

Wet places in savannas, Pinar del Rio, October, *Wright* 1545; Puentes Grandes, *Leon* 283; Cienfuegos, *Pringle* 26, Habana, *Leon* 568. The following are in the herbarium of the New York Botanical Garden: Santiago de Cuba, *Underwood & Earle* 163; Matanzas, *Britton & Shafer* 512; *Eggers* 4870.

The Grisebach specimen is from eastern Cuba, 1859, no. 1545. This species has been referred to *P. molle* Sw., but the latter is a quite different Brazilian species. It may be that *P. muticum* Forsk.[a] is an older name for this species.

Salzmann's specimen from Bahia, upon which *Panicum equinum* is based, is in the herbarium of Professor van Heurck at Antwerp; a duplicate is in the herbarium at Florence. The specimen from *Reugger*, Paraguay, also cited by Steudel, is in the herbarium of the Museum at Paris, and also belongs to this species.

30. **Panicum parvifolium** Lam. Tabl. Encycl. **1:** 173. 1791.

Wright 3458; Herradura, *Tracy* 9060, 9079, *Hitchcock* in 1906, *Shafer;* Pinar del Rio, *Shafer* 430 in Herb. N. Y. Bot. Gard.

The Grisebach specimens are from western Cuba, 1863, numbered, "901=3458" and "927=3458." This is listed by Grisebach[b] as *P. cyanescens*. The type of *P. parvifolium* is in the Lamarck Herbarium at Paris. *Wright* 3458 in the Gray Herbarium is labeled "In lagunas (ponds) Los Almacigos, July 28," and "On tembladeros in lagunas, Asiento Viejo de San Julian, Nov."

31. **Panicum pauciciliatum** Ashe, Journ. Elisha Mitch. Soc. **16:** 87. 1900.

On crumbling banks, Loma Pelada, November 20, *Wright* 3876.

There is some material of this species mixed with *Wright* 3461 in the Krug and Urban Herbarium. This species occurs also in Porto Rico (*Heller & Heller* 982b, 639, *Underwood & Griggs* 955),and is common in the Atlantic coastal plain of the southern United States.

32. **Panicum pilosum** Sw. Prod. 22. 1788.

Panicum distichum Lam. Encycl. **4:** 731. 1797.

Panicum pilisparsum Meyer, Prim. Fl. Esseq. 57. 1818.

Wright 3457; Herradura, *Van Hermann* HC 763, *Tracy* 9063; Isle of Pines, *Curtiss* 305, *Taylor* 36 in Gray Herbarium.

There seems to be an error in the number of the Wright specimen. It is published as 3451 in Grisebach's catalogue and in Flora Cubana, and the specimen is so numbered in the Kew and the Grisebach herbaria, but in the Sauvalle and the Berlin herbaria the number is 3457. The Grisebach specimen is from western Cuba, 1863, numbered "888=3451."

The hairs on the rachis are variable. Curtiss's 305 in the National Herbarium is without hairs; the same number in the herbarium of the Cuba Experiment Station has hairs on some of the spikes. Wright's 3451 in the Gray Herbarium is from "Retiro, July 15, in woods (damp)."

33. **Panicum polycaulon** Nash, Bull. Torr. Club **24:** 200. 1897.

Wright 3875 in National Herbarium; Herradura, *Hitchcock* in 1906; *Shafer* 480 in Herb. N. Y. Bot. Gard.; Isle of Pines, *Palmer & Riley* 990.

34. **Panicum repens** L. Sp. Pl. ed. 2. 87. 1762.

Habana, *Leon* 296, 563.

35. **Panicum reptans** L. Syst. Nat. ed. 10. **2:** 870. 1759.

Panicum grossarium L. op. cit. 871.

Panicum caespitosum Sw. Fl. Ind. Occ. **1:** 140. 1797.

Panicum prostratum Lam. Tabl. Encycl. **1:** 171. 1791.

Panicum insularum Steud. Syn. Pl. Glum. **1:** 160. 1854.

Wright 762, 763, 3857; Habana, *Leon* 276, 292, 297, 566, 576, *Curtiss* 691, *Hitchcock* in 1906; San Antonio, *Hitchcock* in 1906; Baracoa, *Pollard, Palmer & Palmer* 19; Madruga, *Curtiss* 536; Colon, *Baker* HC 3588; Herradura, *Tracy* 9103; Cienfuegos, *Pringle* 73; *Combs* 253 in Gray Herbarium; Yumury Valley, *Rugel* 1985 in Gray Herbarium. The following are in the herbarium of the New York Botanical Garden: La Magdalena, *Earle & Baker* 2455; Baracoa, *Underwood & Earle* 1391; Yumury Mountains, *Rugel* 195.

[a] Fl. Aegypt. Arab. 20. 1775.

[b] Cat. Pl. Cub. 233. 1866.

The Grisebach specimen from eastern Cuba, 1860, is numbered "105=762." The types of the above synonyms are all identical.[a] The West Indian grass commonly known as *P. grossarium* is *P. adspersum* Trin.

The type of *Panicum insularum* Steud. labeled "Antillae minores, Hohenacker" is in the Museum at Paris.

36. **Panicum rugelii** Griseb. Cat. Pl. Cub. 233. 1866.

Shady woods, Valestina, September 27, *Wright* 3465; Pinar del Rio, *Baker* HC 3790; San Antonio, *Hitchcock* in 1906; Matanzas, *Britton & Shafer* 106 in Herb. N. Y. Bot. Gard.

Creeping flat along the surface of the ground in shady woods, the leaves distinctly dorso-ventral, more or less pubescent. In the Grisebach Herbarium is *Rugel* 188 from Matanzas, the type specimen, and *Wright* 3465. A duplicate type is in the Gray Herbarium.

37. **Panicum scoparium** Lam. Encycl. **4:** 444. 1797.

Panicum viscidum Ell. Bot. S. C. & Ga. **1:** 123. 1816.

Wright 3467.

The specimen with this number in the Grisebach Herbarium is the same. The specimen in the Gray Herbarium is labeled "In loose bunches, road to Pinal Mayarí, Aug. 4."

38. **Panicum sellovii** Nees, Agrost. Bras. 153. 1829.

Panicum lasianthum Trin. Icon. 245. 1835.

Panicum valenzuelanum Rich. in Sagra, Hist. Cuba **11:** 304. 1850.

Wet savannas, Hanabana, May 17, *Wright* 3462; *Wright* 3455; edge of thickets in pinales, Pinar del Rio, September, *Wright* 3855; *Shafer* 561 in Herb. N. Y. Bot. Gard.; Herradura, *Tracy* 9098, *Hitchcock* in 1906.

Grisebach's specimen, which is from western Cuba, 1863, and is numbered "935=3455," is the type of *P. rugulosum hirtiglume* Griseb.[b] Wright's 3855 in the Sauvalle Herbarium has a second label which reads, "Low, wet ground beside rivulets, Pinar del Rio, Oct." Wright's 3455 in the Gray Herbarium is labeled "Pinales, La Catalina, Sept. 11," and "Pinal, Rangel, Aug. 6." *P. rugulosum* Trin.[c] has glabrous spikelets. This has not been found in Cuba. The type of *P. sellovii* in the Berlin Herbarium agrees with the type of *P. lasianthum* in the Trinius Herbarium. In the latter herbarium is also a portion of the type of *P. sellovii*. The type of Richard's species is at Paris.

39. **Panicum sloanei** Griseb. Fl. Brit. W. Ind. 551. 1864.

Hillsides, scandent or trailing, Valestina, September 27, *Wright* 3878; near Habana, *Britton & Shafer* 115, 759, Guanajay, *Baker* HC 4587, 4592; San Antonio, *Hitchcock* in 1906; Cienfuegos, *Combs* 55 in Gray Herbarium; *Rugel* 872 in Gray Herbarium. The following are in the herbarium of the New York Botanical Garden: Matanzas, *Britton & Wilson* 121, 393; *Rugel* 868; Santiago de Cuba, *Taylor* 328; Madruga, *Britton & Shafer* 759; Isle of Pines, *Taylor* 22.

Leaf blades larger and broader and panicle larger and more widely spreading than in *P. divaricatum*. In the Grisebach Herbarium are two specimens, "In sylvis densis, Matanzas, *Rugel* 872," and "Woods, Hanabana, June 17, 1865," *Wright* 269. A specimen in the herbarium of the New York Botanical Garden from Matanzas (*Britton & Shafer* 586) is doubtfully referred here.

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[a] For a discussion see Contr. Nat. Herb. **12:** 119. 1908.

[b] Cat. Pl. Cub. 233. 1866.

[c] Gram. Pan. 195. 1826.

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40. **Panicum stenodes** Griseb. Fl. Brit. W. Ind. 547. 1864.

Low, wet pine woods, El Salado, August, *Wright* 3871; Herradura, *Hitchcock* in 1906, *Baker & Abarca* HC 4192, *Baker* HC 2956, Habana, *Leon* 567; Isle of Pines, *Curtiss* in 1904 in Herb. N. Y. Bot. Gard.

The Grisebach specimen is labeled "Sandy ground in the Cienaga, Hanabana, May 17," no. 192. Two other specimens, 284 and 285, included by Grisebach in this cover, are *P. distantiflorum*. *P. caricoides* Nees[a] differs in having larger spikelets (2 mm. long) with bristles at apex of pedicel, and flat blades, villous on upper surface, as shown by the type in the Munich Herbarium and a portion in the Trinius Herbarium.

41. **Panicum strigosum** Muhl.; Ell. Bot. S. C. & Ga. **1:** 126. 1816.

Savannas around base of palms, Daganiguas, September, *Wright* 3875; El Guama, *Palmer & Riley* 213.

Wright's 3875 in the National Herbarium is *P. polycaulon*.

42. **Panicum swartzianum** Hitchc. Contr. Nat. Herb. **12:** 140. 1908.

Panicum lanatum Sw. Prod. 24. 1788, not Rottb. 1776.

Santiago de Cuba, *Hamilton* 218 in Herb. N. Y. Bot. Gard.

43. **Panicum tenerum** Beyrich; Trin. Mem. Acad. Petersb. VI. **3:** 341. 1835.

In dense bunches in dried-up ponds, Pinar del Rio, December, *Wright* 188; Herradura, *Baker & Dimmock* HC 4837, *Hitchcock* in 1906, *Tracy* 9080; "a tall branching grass in deepish water of lagunas, Pinar del Rio, Sept.," *Wright* 3870 in National Herbarium.

Wright's 188 is mixed with *P. distantiflorum* and has, in addition to the label quoted, another, "Savannas of Guamaroca, July 28." Wright's 3870 is also mixed with *P. distantiflorum*. The Florida specimens of *P. tenerum* have been going under the name of *P. stenodes*. Wright's 3860 in the Gray Herbarium is *P. tenerum*.

44. **Panicum tenue** Muhl. Gram. 118. 1817.

Panicum albomarginatum Nash, Bull. Torr. Club **24:** 40. 1897.

Sandy pine woods, Pinar del Rio, September, *Wright* 3463 in part; Herradura, *Shafer* 560, *Baker* HC 2967, 2973, 2977, *Hitchcock* in 1906; Pinar del Rio, *Shafer* 320 in part; Isle of Pines, *Taylor* 32.

For other specimens distributed as *Wright* 3463, see *P. caerulescens*, *P. leucothrix*, and *P. wrightianum*.

45. **Panicum tricanthum** Nees, Agrost. Bras. 210. 1829.

Wright 753; Habana, *Curtiss* 598; Vento, *Leon* 557.

No. 753 of Wright in the National Herbarium is labeled "In large, loose bunches beside the river Agabama Guinia, Trinidad, May 5." The specimen in the Grisebach Herbarium is from western Cuba, 1863, and is numbered "948=753." In the Gray Herbarium there are two specimens, "Villa Clara, Macagua, Jan. 21," 1860–64, and "Santa Isabel, along rivulets," eastern Cuba, in 1856–57.

46. **Panicum trichoides** Sw. Prod. 24. 1788.

Prope villam Monte Verde dictam, Cuba Orientali, 1859, *Wright* 1538, in Gray Herbarium; Habana, *Curtiss* 714, *Britton & Wilson* 510; Guanabacoa, *Leon* 206.

A weed in cultivated soil. *P. brevifolium* L., to which our species has been referred, is from India (*P. ovalifolium* Poir. as described in Hooker's Flora of British India).

47. **Panicum virgatum cubense** Griseb. Cat. Pl. Cub. 233. 1866.

Panicum virgatum obtusum Wood, Bot. & Flor. 392. 1874.

Panicum virgatum breviramosum Nash, Bull. Torr. Club **23:** 150. 1896.

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[a] Trin. Gram. Pan. 149. 1826.

Marshes, Hanabana, May 27, *Wright* 3873; Batabano, *Baker* HC 2763, *Hitchcock* in 1906, *Palmer & Riley* 1134.

Wright's specimen in the Sauvalle Herbarium has also the secondary number 183. In the Grisebach Herbarium this occurs with the number 183 and is labeled *Panicum virgatum* variety *cubense*, "Low savannas, Hanabana, May 19." This form is characterized by the more obtuse spikelets, narrower panicle, and culms solitary or few in a clump.

48. **Panicum wrightianum** Scribn. U. S. Dept. Agr. Div. Agrost. Bull. **11:** 44. 1898.

Panicum minutulum Desv. Opusc. 87. 1831, not Gaud. 1826.

Wright 3463 in National Herbarium.

There is a specimen of this species in the Grisebach Herbarium from western Cuba, 1863, numbered "895=3463," and bearing the note "Spiculis puberulis." Wright's 3463 in the Boissier and in the Kew Herbarium consists of this species and *P. leucothrix*. It is to be noted that *P. tenue* and *P. caerulescens* are also distributed in various herbaria as *Wright* 3463. Wright's 3463 in the Gray Herbarium is labeled "Lagunas, Vueltabajo, July 24." The sheet also bears a small plant of *P. leucothrix*.

49. **Panicum zizanioides** H. B. K. Nov. Gen. & Sp. **1:** 100. 1816.

Panicum oryzoides Sw. Prod. 23. 1788, not Ard. 1764.

Wright 3466; Laguna Castellano, *Baker* HC 4335.

Grisebach's specimen of *Wright* 3466 is also without locality.

33. ICHNANTHUS Beauv. Agrost. 56. *pl. 12. f. 1.* 1812.

Blades, especially those of sterile shoots, contracted into petiole-like bases, as much as 1 cm. long.....4. *I. wrightii.*

Blades not contracted into petiole-like bases.

First glume as long as spikelet; stem creeping, blades ovate.....2. *I. nemorosus.*

First glume one-half to three-fourths as long as spikelet; stem ascending.

Blades narrowly linear-lanceolate, thick and firm.....1. *I. mayarensis.*

Blades ovate-lanceolate, thin, usually 10 to 15 mm. wide...3. *I. pallens.*

1. **Ichnanthus mayarensis** (Wright).

Panicum mayarense Wright, Anal. Acad. Cienc. Habana **8:** 206. 1871; Sauv. Fl. Cub. 197.

Pinales de Mayarí, July 24, and Mayarí Abajo, August 2 (1860–64), *Wright* 3468 in Gray Herbarium.

This species is represented by two sheets, as noted above, the second of which, marked Mayarí Abajo, is the type, as this locality agrees with that published. This number has been found in no other herbarium. The fertile lemma is slightly over 2 mm. (2.2 mm.) long, and the margins do not meet except at the tip, thus exposing a narrow strip of the palea. The scars at the base are small and the wings are wanting.

2. **Ichnanthus nemorosus** (Sw.) Doell in Mart. Fl. Bras. **2**^{2}: 289. 1877.

Panicum nemorosum Sw. Prod. 22. 1788.

In dense woods, Retiro, November 20, *Wright* 3881; damp woods near the Mogote de Mono, October 8, *Wright* 3882; shady banks of Rio Sico in Arroyo Hondo, Pinar del Rio, December, *Wright* 3858.

3. **Ichnanthus pallens** (Sw.) Munro; Benth. Fl. Hongk. 414. 1861.

Panicum pallens Sw. Prod. 23. 1788.

Wright 750; El Guama, *Palmer & Riley* 130, 218; Baracoa, *Pollard, Palmer & Palmer* 15. The following are in the herbarium of the New York Botanical Garden: Santiago de Cuba, *Taylor* 385, 526, *Hamilton* 215; Baracoa, *Underwood & Earle* 267; El Sigual, *Eggers* 4661.

There are four specimens of this in the Grisebach Herbarium: No. 750 labeled "Prope villam Monte Verde dictam. Cuba orientali;" another numbered 750 from eastern Cuba, 1856–57; a Wright specimen without number or locality collected in 1860–64; and a specimen with proliferous spikelets, numbered 887, "Cuba occ. Wr. 1863." This species not infrequently occurs with proliferous spikelets, as in *Palmer & Riley* 130 cited above. The spikelets then consist of many sterile lemmas and the plants appear as if belonging to the tribe Festuceae.

4. Ichnanthus wrightii sp. nov.

Culms slender, prostrate-spreading, more or less rooting at the nodes, glabrous or sparsely villous, 20 to 30 cm. long; sheaths mostly less than half the length of the internodes, striate-nerved, villous on the margins, otherwise glabrous or nearly so; blades ovate-lanceolate, striate-nerved, faintly 3 to 5-ribbed, glabrous, 12 to 30 mm. long, 2 to 8 mm. wide on the sterile shoots, somewhat larger and thicker on the ascending flowering culms, all abruptly or cordately narrowed into a slender stalk 1 to 5 mm. long on the fertile culms, or as much as 15 mm. long on the sterile shoots; panicles 4 to 8 cm. long, consisting of a few spike-like racemes, 0.5 to 2 cm. long; spikelets 3 mm. long, glabrous, the pedicel minutely pubescent; lower glume about half the length of the spikelet, 3-nerved; second glume and sterile lemma equal, acuminate, strongly 5-nerved; fertile lemma scarcely 2 mm. long, the edges meeting and covering the palea, except at the very base, the outer margin of the base of the lemma bearing a scar at each side, but no wings.

Wright's 3880. U. S. National Herbarium no. 559959 of this collection is the type. The specimen in the Sauvalle Herbarium is labeled, "Under overhanging rocks (damp) and around base of palms beside the Rio Seco in Arroyo Honda, Pinar del Rio, Dec." The Grisebach specimen consists of a single spikelet in a packet, labeled "Echinolaena Sp." no. 760. In the Kew Herbarium there are four specimens numbered 2, 23, 244, 760. Nos. 760 and 3880 are also in the Gray Herbarium. This species is allied to *I. mayarensis*.

34. TRICHOLAENA Schrad. in Schult. Mant. 2: 163. 1824.

1. **Tricholaena rosea** Nees, Cat. Sem. Hort. Vratisl. 1835.
   Britton, Britton & Shafer 533.
   Sparingly introduced.

35. OPLISMENUS Beauv. Fl. Owar. 2: 14. *t. 58*. 1804.

1. **Oplismenus hirtellus** (L.) Roem. & Schult. Syst. 2: 481. 1817.
   Panicum hirtellum L. Syst. Nat. ed. 10. 2: 870. 1759.
   Panicum setarium Lam. Tabl. Encycl. 1: 170. 1791.

   Woods, Hanabana, June 1, *Wright* 1543; damp woods, Monte Verde, March, *Wright* 751; Santiago de las Vegas, *Baker* HC 5051, *Hitchcock* in 1906; San Antonio, *Hitchcock* in 1906; Guanajay, *Baker* HC 3461; Habana, *Curtiss* 593, *Leon* 556; Matanzas, *Palmer & Riley* 12; Cienfuegos, *Pringle* 76; *Combs* 667 in Gray Herbarium; El Guama, *Palmer & Riley* 146; Isle of Pines, *Curtiss* 268; Matanzas, *Rugel* 189 in Gray Herbarium. In the herbarium of the New York Botanical Garden are the following: Matanzas, *Britton & Shafer* 221; Santiago de Cuba, *Taylor* 422, 481.

   Wright's numbers 751 and 1543 in the Grisebach Herbarium are from eastern Cuba, 1859. The latter is numbered 1593 in Sauvalle's Flora Cubana.

   It is quite possible that the specimens here included may be referred to distinct species. The type of *Panicum setarium* Lam. at Paris resembles Wright's 1543. The blades are short and the clusters of spikelets globose and few-flowered. *Wright* 751 and *Curtiss* 268 and 593 have larger and longer blades and spikes, but some of the other specimens are intermediate.

36. CHAETOCHLOA Scribn. U. S. Dept. Agr. Div. Agrost. Bull. **4:** 38. 1897.

Bristles retrorsely barbed; plant annual.....6. *C. verticillata.*
Bristles antrorsely barbed; plants perennial.
Culms pilose.....1. *C. hispida.*
Culms glabrous.
Inflorescence dense and spike-like; involucral bristles 5 or more.
Bristles scarcely exceeding the spikelets; racemes slender.....4. *C. purpurascens.*
Bristles 2 to 4 times as long as spikelets; racemes thick.....2. *C. imberbis.*
Inflorescence comparatively loose; involucral bristles 1 to 3.
First glume 5-nerved, second 9 to 11-nerved.....3. *C. onurus.*
First glume 3-nerved, second 5-nerved.....5. *C. setosa.*

1. **Chaetochloa hispida** Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. **21:** 25. 1900.

Sandy pine woods, La Grija, Nueva Filipina, January, *Wright* in 1865, in the Gray Herbarium.

2. **Chaetochloa imberbis** (Poir.) Scribn. U. S. Dept. Agr. Div. Agrost. Bull. **4:** 39. 1897.

Panicum imberbe Poir. Encycl. Suppl. **4:** 272. 1817.

Savannas, Chirigote, June 13, *Wright* 3472, 3473; Santiago de las Vegas, *Baker* HC 518, 561, 636, 1358, *Hitchcock* in 1906; Habana, *Curtiss* 749, *Leon* 269, *Tracy* 9112; San Diego de los Baños, *Palmer & Riley* 546; Herradura, *Baker* HC 2965, *Hitchcock* in 1906; Isle of Pines, *Taylor* 45. The following are in the herbarium of the New York Botanical Garden: Matanzas, *Britton & Wilson* 170, *Britton & Shafer* 244; Sagua, *Britton & Wilson* 319; Madruga, *Shafer* 454.

The species of Chaetochloa here considered are accepted as defined by Scribner and Merrill.[a] I have not seen the type of *Panicum imberbe* Poir. nor of *Panicum geniculatum* Lam., which may be an older name for the same.

In the Grisebach Herbarium are the following Wright specimens: 1. "Wet ground around lagunas, Hanabana, May 16," no. 199 of 1865, a prostrate bunch with culms 15 to 20 cm. long. The bristles are only a little longer than the spikelets, the spikes about 1 cm. long, the blades without the scattered long hairs on the upper surface found in most of the specimens. 2. No. 200 of 1865, which Grisebach has labeled *Setaria glauca* α. This also has short bristles. 3. No. 3472, 1860–64, bristles short. 4. No. 3473, 1860–64, bristles about 5 mm. long.

2a. **Chaetochloa imberbis penicillata** (Nees) Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. **21:** 11. 1900.

Panicum penicillatum Nees, Agrost. Bras. 242. 1829.

Matanzas, July 7, *Wright* 3888; Santiago de las Vegas, *Baker* 522, 1276; Guines, *Leon* 428.

This differs from *C. imberbis* chiefly in having longer bristles.

3. **Chaetochloa onurus** (Willd.) Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. **21:** 27. 1900.

Panicum onurus Willd.; Nees, Agrost. Bras. 251. 1829, as synonym.

Setaria onurus Griseb. Fl. Brit. W. Ind. 555. 1864.

Wright 3474; *Wright* 182; *Wright* 3887 in National Herbarium (3487 in Sauv. Fl. Cub.); Triscornia, *Tracy* 9090; Cienfuegos, *Combs* 264 in Gray Herbarium. The following are

[a] U. S. Dept. Agr. Div. Agrost. Bull. **21:** 10. 1900.

in the herbarium of the New York Botanical Garden: Santiago de Cuba, *Taylor* 232; Madruga, *Shafer* 453; Matanzas, *Britton & Wilson* 29.

In the Grisebach Herbarium are two Wright specimens of this species, "Savannas of Guanacaro, July 28," no. 287 of 1865, and no. 3474 of 1860 to 1864.

4. **Chaetochloa purpurascens** (H. B. K.) Scribn. & Merr. U. S. Dept. Agr. Div Agrost. Bull. **21:** 13. 1900.
Setaria purpurascens H. B. K. Nov. Gen. & Sp. **1:** 110. 1816.
Batabano, *Shafer* 487; Jaguey, *Eggers* 5320 in Herb. N. Y. Bot. Gard.

5. **Chaetochloa setosa** (Sw.) Scribn. U. S. Dept. Agr. Div. Agrost. Bull. **4:** 39. 1897.
Panicum setosum Sw. Prod. 22. 1788.
Isle of Pines, *Palmer & Riley* 1000 in Herb. N. Y. Bot. Gard.; Santiago de Cuba, *Taylor* 13, 71; Matanzas, *Rugel* 880.

6. **Chaetochloa verticillata** (L.) Scribn. U. S. Dept. Agr. Div. Agrost. Bull. **4:** 39. 1897.
Panicum verticillatum L. Sp. Pl. ed. 2. 82. 1762.
Habana, *Curtiss* 693, *Hitchcock* in 1906, *Baker*, HC 2675, *Leon* 555.
A weed in the Botanical Garden.

37. CENCHRUS L. Sp. Pl. 1049. 1753.

Blades crowded, short, stiff, conspicuously distichous.....2. *C. distichophyllus.*
Blades not crowded, stiff, nor distichous.
Basal bristles of burs stout.....1. *C. carolinianus.*
Basal bristles of burs numerous, slender.
Burs 12 mm. or more wide, lobes erect.....3. *C. echinatus.*
Burs not over 8 mm. wide, lobes interlocking.....4. *C. viridis.*

1. **Cenchrus carolinianus** Walt. Fl. Car. 79. 1788.
Cenchrus tribuloides L. err. det. Griseb. Fl. Brit. W. Ind. 556. 1864.
Cojimar, *Hitchcock* in 1906; Triscornia, *Hitchcock* in 1906; Guanajay, *Palmer & Riley* 781; Habana, *Palmer & Riley* 1146; *Wright* 3476 in Gray Herbarium.

2. **Cenchrus distichophyllus** Griseb. Cat. Pl. Cub. 234. 1866.
Wright 3475.
The Grisebach specimen, which is the type of this species, is from western Cuba, 1863, numbered "916=3475." Wright's 3475 in the Gray Herbarium is from "Pinales, Guanes, Remates, Dec."

3. **Cenchrus echinatus** L. Sp. Pl. 1050. 1753.
Santiago de las Vegas, *Hitchcock* in 1906; Guanajay, *Palmer & Riley* 679; Isle of Pines, *Taylor* 24; Santiago de Cuba, *Taylor* 24 in Herb. N. Y. Bot. Gard.

4. **Cenchrus viridis** Spreng. Syst. **1:** 301. 1825.
Wright 3889; Guanajay, *Palmer & Riley* 665; Santiago de Cuba, *Millspaugh* 1110, *Pollard, Palmer & Palmer* 284; *Wright* 3476 in Grisebach Herbarium; Cienfuegos, *Combs* 597 in Gray Herbarium. The following are in the herbarium of the New York Botanical Garden: Matanzas, *Britton & Shafer* 127; Santiago de Cuba, *Underwood & Earle* 168. *Wright* 3889 is listed in Sauvalle's Flora Cubana as "Andropogon Sp.?" It would seem that there must be some error in numbering, but this number in the Gray Herbarium is also Cenchrus.
Cenchrus viridis may be distinguished from *C. echinatus* by the smaller burs and more incurved involucre lobes.

38. **PENNISETUM** Rich. in Pers. Syn. **1:** 72. 1805.[a]

Spike loose; bristles all naked.....1. *P. domingense.*
Spike narrow, dense; some of the bristles plumose.....2. *P. setosum.*

1. **Pennisetum domingense** (Spreng.) Spreng. Syst. **1:** 302. 1825.
   Gymnothrix domingensis Spreng.; Schult. Mant. **2:** 284. 1824.
   Eastern Cuba, *Wright* 1547 in 1857 in the Grisebach and Gray herbaria.

2. **Pennisetum setosum** (Sw.) Rich. in Pers. Syn. **1:** 72. 1805.
   Cenchrus setosus Sw. Prod. 26. 1788.
   In thickets skirting pine woods, Pinar del Rio, *Wright* 3471.
   The Grisebach specimen is from eastern Cuba, numbered "111=3475." Wright's 3471 in the Gray Herbarium is labeled "Edge of savannas, San Juan de Buenavista, Nov. 24."

39. **CHAETIUM** Nees, Agrost. Bras. 269. 1829.

1. **Chaetium cubanum** (Wright).
   Perotis? cubana Wright, Anal. Acad. Cienc. Habana **8:** 288. 1871; Sauv. Fl. Cub. 202.
   Wright 735 in Gray Herbarium.
   The locality is not indicated except that the collection was made in eastern Cuba in 1856–57. This is referred by Doell[b] to *Panicum chaetium* Steud. (*Chaetium festucoides* Nees), but it differs in many respects. The blades are short and narrow, mostly involute; the inflorescence is loose, the spikelets few and distant, narrowed to a pedicel 1.5 mm. long, strongly bearded at the base; first glume very narrow, 22 mm. long including awn, 3-nerved at base; second glume 5-nerved, 18 mm. long, including awn; sterile lemma and fertile lemma thin, 3-nerved, awnless, 4.5 mm. long.

40. **PARATHERIA** Griseb. Cat. Pl. Cub. 236. 1866.[c]

1. **Paratheria prostrata** Griseb. Cat. Pl. Cub. 236. 1866.
   Panicum leptochyrium Doell in Mart. Fl. Bras. **2**[2]**:** 150. 1877.
   Wright 3906; Isle of Pines, *Curtiss* 461.
   The Grisebach specimen, which is the type, bears the secondary number 207, and was collected in 1865. This is listed in Sauvalle's Flora Cubana as *Chamaeraphis parvigluma* Munro, a nomen nudum, and the Wright number is misprinted 3909. In the Gray Herbarium is a specimen of this species from Santarem, Pará, collected by Spruce, which agrees with *Curtiss* 461 in being more pubescent than the Wright specimen. This appears to be a duplicate type of *Panicum leptochyrium* Doell, though the specimen is not numbered.

41. **STENOTAPHRUM** Trin. Fund. Agrost. 175. 1820.

1. **Stenotaphrum secundum** (Walt.) Kuntze, Rev. Gen. Pl. **2:** 794. 1891.
   Ischaemum secundum Walt. Fl. Car. 249. 1788.
   Wright 3490; Santiago de las Vegas, *Baker* HC 443, 794, 3649; Matanzas, *Britton & Shafer* 140; Guanabacoa, *Baker & Hasselbring* 7200; San Antonio, *Hitchcock* in 1906; Habana, *Palmer & Riley* 822; Cape Corrientes, *Millspaugh* 1459; Cabañas, *Palmer & Riley* 759; Isle of Pines, *Palmer & Riley* 1008, *Rowlee* 49; Cienfuegos, *Combs* 535 in Gray Herbarium. The following are in the herbarium of the New York Botanical Garden: Batabano, *Shafer* 158; Isle of Pines, *Curtiss* in 1904.
   The Grisebach specimen was collected in 1860–64.

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[a] In this genus I have followed Leeke, Zeitschr. Naturw. **79.** 1907.

[b] In Mart. Fl. Bras. **2**[2]**:** 150. 1877.

[c] This genus is referred to Chamaeraphis R. Br. by Hackel (Engl. & Prantl, Pflanzenfam.) but seems sufficiently distinct.

42. OLYRA L. Syst. Nat. ed. 10. 2: 1261. 1759.

1. **Olyra latifolia** L. Syst. Nat. ed. 10. **2:** 1261. 1759.

Retiro, February 27, *Wright* 746; Las Acostas, *Baker* HC 5239; Vento, *Baker* HC 584; Lomas de Candelaria, *Baker* HC 1624; Madruga, *Shafer;* Baracoa, *Pollard, Palmer & Palmer* 53; Cienfuegos, *Pringle* 70; El Guama, *Palmer & Riley* 115, 216; Herradura, *Baker* HC 2940, *Hitchcock* in 1906; Isle of Pines, *Palmer & Riley* 1058, 1066, *Curtiss* 293, *Taylor* 26, 27, in Gray Herbarium; Yumury Mountains, *Rugel* 186 in Gray Herbarium; Cienfuegos, *Combs* 210 in Gray Herbarium; Marianao, *Leon* 583. The following are in the herbarium of the New York Botanical Garden: Cedro, *Underwood & Earle* 1538; Yumury Mountains, *Rugel* 873; Santiago de Cuba, *Hamilton* 209; Matanzas, *Britton & Wilson* 457; Madruga, *Britton & Shafer* 315, 736; *Eggers* 4639.

There are two Wright specimens of this in the Grisebach Herbarium, no. 162 of 1865 and no. 746 from eastern Cuba, 1859.

43. LITHACHNE Beauv. Agrost. 135. *t. 24. f. 11.* 1812.

Blades ovate, 1 to 2 cm. wide.....1. *L. pauciflora.*
Blades oblong, less than 5 mm. wide.....2. *L. pineti.*

1. **Lithachne pauciflora** (Sw.) Beauv.; Poir. Dict. Sci. Nat. **27:** 60. 1823.

Olyra pauciflora Sw. Prod. 21. 1788.

Olyra axillaris Lam. Encycl. **4:** 547. 1797.

Lithachne axillaris Beauv. Agrost. 166. *t. 24. f. 11.* 1812.

Wright 732; Santiago de las Vegas, *Baker* HC 4148, 5049, *Hitchcock* in 1906; San Antonio, *Hitchcock* in 1906; Cienfuegos, *Pringle* 54, *Combs* 319 in Gray Herbarium; Madruga, *Curtiss* 661; El Guama, *Palmer & Riley* 105; Herradura, *Baker* HC 2941, *Hitchcock* in 1906; Habana, *Leon* 584. In the herbarium of the New York Botanical Garden: Santiago de Cuba, *Hamilton* 210; *Eggers* 5356.

There are three specimens of this in the Grisebach Herbarium, two from eastern Cuba, 1856–57 and 1859, both numbered 732, and one from western Cuba numbered "1133=732." One sheet of *Wright* 732 in the Gray Herbarium is from "Banks of river, Santa Cruz, San José, Apr. 8."

2. **Lithachne pineti** (Wright) Chase, Proc. Biol. Soc. Wash. **21:** 182. 1908.

Olyra pineti Wright; Griseb. Mem. Amer. Acad. n. ser. **8:** 532. 1862.

Eastern Cuba in 1859, *Wright* 1536 in Grisebach Herbarium. There is a duplicate type in the Gray Herbarium.

44. MNIOCHLOA Chase, Proc. Biol. Soc. Wash. **21:** 185. 1908.

Flowering culms much exceeding sterile ones; fruit glabrous.....1. *M. pulchella.*
Flowering and sterile culms about equal in height; fruit pubescent.2. *M. strephioides.*

1. **Mniochloa pulchella** (Griseb.) Chase, Proc. Biol. Soc. Wash. **21:** 186. 1908.

Digitaria pulchella Griseb. Cat. Pl. Cub. 231. 1866.

Strephium? pulchellum Wright, Anal. Acad. Cienc. Habana **8:** 202. 1871; Sauv. Fl. Cub. 193.

Crece al borde de precipicios en el Yunque de Baracoa *Wright* 3448.

2. **Mniochloa strephioides** (Griseb.) Chase, Proc. Biol. Soc. Wash. **21:** 186. 1908.

Olyra strephioides Griseb. Cat. Pl. Cub. 229. 1866.

Wright 3435; San Diego de los Baños, *Caldwell & Baker* 7011.

The Grisebach specimen, which is the type, is from western Cuba, 1863, numbered "942=3435."

45. PHARUS L. Syst. Nat. ed. 10. 2: 1269. 1759.

Culms creeping at base.....3. *P. parvifolius.*
Culms not creeping at base.
Fruit pubescent only at the tip, slightly exceeding the glume.....2. *P. latifolius.*
Fruit pubescent all over, 2 to 3 times as long as the glume.....1. *P. glaber.*

1. **Pharus glaber** H. B. K. Nov. Gen. & Sp. **1:** 196. 1816.

Dense woods, Valestina, September 27, *Wright* 733; Managuas, *Baker* HC 455; El Guama, *Palmer & Riley* 123, 260; San Antonio, *Hitchcock* in 1906; Yumury Mountains, *Rugel* 871 in Gray Herbarium; Cienfuegos, *Combs* 363 in Gray Herbarium.

The Wright specimens in the Grisebach Herbarium are no. 268 of 1865, no. 733 from eastern Cuba, 1856–57, and no. 733 from eastern Cuba, 1859. The following are in the herbarium of the New York Botanical Garden: Santiago de Cuba, *Taylor* 40, 275, 284, 479; Matanzas, *Britton & Wilson* 66, 227; Madruga, *Britton & Shafer* 789; *Eggers* 4708.

2. **Pharus latifolius** L. Syst. Nat. ed. 10. **2:** 1269. **1759.**

Santiago de Cuba, *Taylor* 217, *Hamilton* 211, both in Herb. N. Y. Bot. Gard.

3. **Pharus parvifolius** Nash, Bull. Torr. Club **35:** 301. 1908.

Jaguey, *Eggers* 4939, *Maxon* 4155, in Herb. N. Y. Bot. Gard.

This species, which also occurs in Haiti, differs in having stems with creeping bases.

46. LUZIOLA Gmel. Syst. Nat. 1: 636. 1791.[a]

1. **Luziola bahiensis** (Steud.)

Caryochloa bahiensis Steud. Syn. Pl. Glum. **1:** 5. 1854.
Luziola alabamensis Chapm. Fl. So. U. S. 584. 1860.
Luziola longivalvula Doell in Mart. Fl. Bras. **2**[2]**:** 17. 1871.

In rivulets, the panicles just above the surface of the water, pinales, Pinar del Rio, December, *Wright* 3813.

In the National Herbarium are: Duplicate type of *L. alabamensis* Chapm., collected by J. F. Beaumont, Brooklyn, Alabama, in 1859; duplicate type of *Caryochloa bahiensis* Steud., and also of *Luziola longivalvula* Doell (Bahia, *Salzmann*; Brazil, Prov. Minas Geraes, *Henschen* 1376, cited by Doell).

47. ORYZA L. Sp. Pl. 333. 1753.

1. **Oryza sativa** L. Sp. Pl. 333. 1753.

Wright 3838.

In the National Herbarium is another specimen numbered 191.

48. HOMALOCENCHRUS Mieg. Act. Helvet. Phys.-Math. 4: 307. 1760.

Spikelets 3 mm. long.....1. *H. hexandrus.*
Spikelets 2 mm. long.....2. *H. monandrus.*

1. **Homalocenchrus hexandrus** (Sw.) Kuntze, Rev. Gen. Pl. **2:** 777. 1891.

Leersia hexandra Sw. Prod. 21. 1788.

Wright 3434, 3837; Herradura, *Hitchcock* in 1906.

The Grisebach specimen is from eastern Cuba, 1860, numbered "118=3434." In Sauvalle's Flora Cubana this number is misprinted 3484. Wright's 3434 in the Gray Herbarium is from "San Mateo, in water 3 feet deep."

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[a] Juss. Gen. Pl. 33. 1789, without citation of species.

2. **Homalocenchrus monandrus** (Sw.) Kuntze, Rev. Gen. Pl. **2:** 777. 1891.
Leersia monandra Sw. Prod. 21. 1788.
Wright 731; Yumury Mountains, *Rugel* 200 in Gray Herbarium.
There are two Wright specimens in the Grisebach Herbarium, both numbered 731; one collected in 1856–57, the other in 1859. Wright's 731 in the Gray Herbarium is labeled "In small tufts on precipitous hillsides, Loma de Rangel, July 11."

49. ACHLAENA Griseb. Cat. Pl. Cub. 228. 1866.

1. **Achlaena piptostachya** Griseb. Cat. Pl. Cub. 229. 1866.
Wright 205; Pinar del Rio, *Baker* HC 3747; Isle of Pines, *Curtiss* 236, *Palmer & Riley* 913; *Wright* 3487 in National Herbarium.
The Grisebach specimens are no. 205 of 1865 and no. 3487 of 1860–64 (type).

50. REYNAUDIA Kunth, Rev. Gram. **1:** 195. *pl. 9*. 1829.

1. **Reynaudia filiformis** (Spreng.) Kunth, Rev. Gram. 195. 1829.
Polypogon cubensis Rich. in Sagra, Hist. Cub. **11:** 313. 1850.
Wright 3428; Herradura, *Baker* HC 4825, *Tracy* 9070, *Hitchcock* in 1906; Isle of Pines, *Curtiss* 371; Cienfuegos, *Combs* 579 in Gray Herbarium. The following are in the herbarium of the New York Botanical Garden: Sagua, *Britton & Wilson* 334; Madruga, *Britton & Shafer* 687.
There are two Wright specimens in the Grisebach Herbarium, one from eastern Cuba in 1860, no. "116=3428," and another from western Cuba in 1863, no. "937=3428." Wright's 3428 in the Gray Herbarium is from "Savannas, Chirigote, July 11."
The type of *Polypogon cubensis* is at Paris.

51. ARISTIDA L. Sp. Pl. 82. 1753.

Lateral awns minute or wanting.....5. *A. scabra.*
Lateral awns about as long as central awn.
Awns united into a twisted base about 3 mm. long; blades involute, usually 3 to 5 cm. long.....3. *A. mohrii.*
Awns not united at base.
Central awn 2 to 3 cm. long; blades elongated, 60 to 90 cm. long.....2. *A. erecta.*
Central awn about 1 cm. long; blades short and stiff.
Awns recurved at base at maturity; glumes about 6 mm. long; culm blades scattered.....4. *A. refracta.*
Awns ascending at base; glumes 8 to 9 mm. long; culms rigid and rush-like, the blades often only 1 to 2 cm. long, commonly approximate in pairs.....1. *A. curtifolia.*

1. **Aristida curtifolia** sp. nov.
Culms cespitose, from a perennial base, slender, stiffly erect, somewhat compressed, smooth, 20 to 30 cm. high, the alternate internodes often shortened, thus bringing the leaves together in approximate pairs; sheaths smooth, striate, short, 5 to 10 mm. long, sometimes slightly villous at throat; blades short, thick, stiffly spreading, flat, folded or involute, glabrous, 5 to 20 mm. long and 0.5 to 1 mm. wide, or the upper reduced to mere awns 2 to 3 mm. long; inflorescence a narrow nearly simple panicle, 5 to 10 cm. long, the spikelets subsessile or occasionally terminating short erect branches about 5 mm. long; glumes nearly equal, 8 to 9 mm. long, 1-nerved, smooth, except the scabrous upper part of the keel of the lower glume; lemma 5 to 6 mm. long with a minutely hairy callus 0.5 mm. long, scabrous toward apex; awns about equal, 10 to 12 mm. long, scabrous, spreading but not recurved or twisted at base.
Type, *Wright* 736, 1865, no. 559960 in the U. S. National Herbarium, which also bears the secondary numbers 282 and 286. Other specimens are: *Wright* 736 in eastern

Cuba, 1856–57 in Sauvalle Herbarium; Jata Hills at Guanabacoa, *Hitchcock* in 1906; *Baker & Hasselbring* HC 7208, 7211; Madruga, *Britton & Shafer* 658 in Herb. N. Y. Bot. Gard.

There are two Wright specimens of this in the Grisebach Herbarium, "Savannas of Guanacaro, July 28, in small tufts," no. 282 of 1865, and no. 736 from eastern Cuba, 1856–57.

This species is readily recognized by its stiff, rush-like culms and short sharp-pointed blades. On the Jata Hills it occurs on dry, grassy slopes.

2. **Aristida erecta** sp. nov.

Culms erect, rather stout, from a perennial root, about 1.5 meters high, glabrous; sheaths glabrous, longer than the internodes; blades glabrous beneath, scabrous on the nerves above, elongated, convolute, much attenuated at the tip, 3 to 5 mm. wide, as much as 1 meter long; panicles 50 cm. long, the numerous scabrous branches ascending below, spreading above, the lower as much as 20 cm. long, all spikelet-bearing to the base; spikelets crowded, the pedicels erect, stout, 2 to 3 mm. long, glumes glabrous, the first 12 to 15 mm. long, scabrous on the keel, abruptly cuspidate or awn-tipped, 3-nerved, one of the lateral nerves somewhat indistinct, second glume 2 to 3 mm. shorter, acuminate, 1-nerved, smooth on the keel, lemma 12 to 13 mm. long, glabrous, the callus about 1 mm. long, bearded, awns spreading, the central 2 to 3 cm. long, the lateral somewhat shorter.

The type specimen was collected by Wright in Cuba in 1865, no. 41161, in the U. S. National Herbarium. This specimen is numbered in pencil 2432, which is an error for 3432. The corresponding specimen in the Grisebach Herbarium was collected in western Cuba in 1863 and is numbered "928=3432." The only other specimen seen is: Herradura, *Tracy* 9076.

This species resembles *A. palustris* (Chapm.) Vasey, but differs in having taller culms, larger and more spreading panicles, and longer glumes and lemma. In *A. palustris* the panicle is narrow and strict, the glumes are about 10 mm. long and nearly equal, and the lemma is only 7 to 8 mm. long.

3. **Aristida mohrii** Nash, Rep. N. Y. Bot. Gard. **1:** 436. 1900.

In roads Hanabana, January 16, *Wright* 737; *Wright* 3433 in part; *Wright* 742 in National Herbarium; Jata Hills at Guanabacoa, *Hitchcock* in 1906; La Caimanera, *Eggers* 5389.

The Grisebach specimen is from eastern Cuba in 1856–57, no. 737. Another Grisebach specimen, *Wright* "931=3433" from western Cuba, 1863, is doubtfully referred here. It appears to be the same as the fragmentary specimen no. 742, mentioned above.

4. **Aristida refracta** Griseb. Cat. Pl. Cub. 228. 1866.

Aristida gyrans Chapm. Bot. Gaz. **3:** 18. 1878.

Dry savannas, Chirigote, October 26, *Wright* 3431; dry savannas, Chirigote, October 31, *Wright* 3832; in dense bunches along rivulets in sandy soil, Pinar del Rio, October, *Wright* 3834; in small dense tufts, sandy pine woods, Coloma, Pinar del Rio, October, *Wright* 3833; *Wright* 3430, 3831; Jata Hills at Guanabacoa, *Hitchcock* in 1906; Herradura, *Hitchcock* in 1906; Isle of Pines, *Palmer & Riley* 995, *Taylor* 20.

In the Grisebach Herbarium are three Wright specimens of this: Western Cuba, 1863, no. "926=3431;" eastern Cuba, 1860, no. "122=3430;" western Cuba, 1863, no. "908=3430."

5. **Aristida scabra** (H. B. K.) Kunth, Rev. Gram. 62. 1829.

Streptachne scabra H. B. K. Nov. Gen. & Sp. **1:** 124. 1816.

Streptachne cubensis Rich.; Sagra, Hist. Cub. **11:** 311: 1850.

Pebbly pinales in small bunches, Pinar del Rio, October, *Wright* 3835; Puentes Grandes, *Leon* 280; Triscornia, *Hitchcock* in 1906; Cojimar, *Hitchcock* in 1906.

The type of *Streptachne cubensis* is at Paris.

52. MUHLENBERGIA Schreb. Syst. Nat. ed. 13. 2: 87. 171. 1791

1. **Muhlenbergia capillaris** (Lam.) Trin. Gram. Unifl. 191. 1824.
Stipa capillaris Lam. Tabl. Encycl. 1: 158. 1791.
In dense tufts, Guinamar, October, *Wright* 3836.

53. SPOROBOLUS R. Br. Prod. Fl. Nov. Holl. 169. 1810.

Plants producing long rhizomes; blades conspicuously distichous .5. *S. virginicus*.
Plants cespitose not producing rhizomes; blades not distichous.
Panicle dense and spike-like.....3. *S. indicus*.
Panicle open.
Spikelets about 1.5 mm. long; panicle pyramidal.....1. *S. argutus*.
Spikelets 2.5 to 4 mm. long; panicle elongated-oblong.
Spikelets 2.5 mm. long; basal sheaths not felty.....4. *S. purpurascens*.
Spikelets 3.5 to 4 mm. long; basal sheaths copiously felty-ciliate.....2. *S. cubensis*.

1. **Sporobolus argutus** (Nees) Kunth, Enum. 1: 215. 1833.
Vilfa arguta Nees, Agrost. Bras. 295. 1829.
Wright 3828; Habana, *Baker* HC 1799, *Leon* 285; Batabano, *Shafer* 484, *Hitchcock* in 1906; Triscornia, *Hitchcock* in 1906. The following are in the herbarium of the New York Botanical Garden: Habana, *Baker* 1818; Guantanamo, *Earle* 86.
The type of Nees's species is at Munich. It is not the same as *Vilfa domingensis* Trin., to which it has sometimes been referred. The Grisebach specimen of this, no. 300 of 1865, consists of two plants with two labels, "Saline grounds, in tufts, Matanzas, July 17," and, "Sand banks by the seashore, Palma Sola, Aug. 8."

2. **Sporobolus cubensis** sp. nov.
Culms cespitose, glabrous, slender, erect, 40 to 60 cm. high; leaves of innovations numerous, the sheaths copiously felty-ciliate on the margins, with white, yellow, or brown hairs, which extend upward along the margins of the blade for a short distance; basal blades very long and narrow, flat, or involute, nearly as long as the culms, 1 to 2 mm. wide, smooth except for the basal hairs, strongly striate-nerved, the two or three upper blades short, 2 or 3 cm. long; panicle slender-pyramidal, glabrous throughout, 8 to 10 cm. long, branches verticillate, lowermost 5 to 8 in a whorl, slender and stiffly spreading, 1.5 to 3 cm. long; spikelets glabrous, tawny, 3.5 to 4 mm. long, appressed, on pedicels 0.5 to 1 mm. long; lower glumes rather broad, one-third to one-half the length of the spikelet, 1-nerved, the upper glume and lemma about equal, weakly 1-nerved; palea as long as or longer than the lemma; grain oval, flat, 2 mm. long.
Type specimen, Isle of Pines, *Curtiss* 392, U. S. National Herbarium no. 522010. Other specimens are: Herradura, *Hitchcock* in 1906; *Wright* 3427 in Sauvalle Herbarium.
Wright's 3427 in the National Herbarium consists of this species, together with *S. purpurascens*. *S. cubensis* is distinguished from *S. purpurascens* by its larger spikelets, 3.5 mm. long, the elongated blades, and the ferruginous-silky basal sheaths. Heller's 4590 from Porto Rico is *S. cubensis*. In the Grisebach Herbarium are three specimens of this from Wright: No. 3427a of 1860–64; no. "922=3422" from western Cuba, 1863; and no. "945=3422" from western Cuba, 1863. (No. 3422 as published in Grisebach's Catalogue, is *Eragrostis sudans*). It will be noted that nos. 3427 and 3427a are the reverse of what they are in the Sauvalle Herbarium. Wright's 3427 in the Gray Herbarium is from "High pine woods, pinales, Mar. 1;" another sheet of this number is part *S. cubensis* and part *S. purpurascens*.
3. **Sporobolus indicus** (L.) R. Br. Prod. Fl. Nov. Holl. 170. 1810.
Agrostis indica L. Sp. Pl. 63. 1753.
Sporobolus jacquemontii Kunth, Rev. Gram. 2: 427. 1831.

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[a] Gen. Pl. 44. 1789, without citation of species.

Savannas, San Cristobal, August, *Wright* 2829; *Wright* 3426; Cojimar, *Baker* HC 5197, 5334; Santiago de las Vegas, *Baker* HC 537, 5111, *Hitchcock* in 1906; Triscornia, *Tracy* 9081; Guanabacoa, *Leon* 186; Puentes Grandes, *Leon* 275, 282; Habana, *Baker* HC 1279; Madruga, *Shafer* 67; Matanzas, *Britton & Wilson* 473; Batabano, *Shafer* 486; Herradura, *Tracy* 9064, 9066, *Hitchcock* in 1906; Consolacion del Sur, *Palmer & Riley* 473; San Diego de los Baños, *Palmer & Riley* 627; Coloma, *Palmer & Riley* 349; El Guama, *Palmer & Riley* 404; Isle of Pines, *Palmer & Riley* 1121, *Taylor* 48, *Curtiss* 323; Arroyo Apolo, *Leon* 586; Cienfuegos, *Combs* 261 and 263 in Gray Herbarium. The following are in the herbarium of the New York Botanical Garden: Santiago de Cuba, *Taylor* 91; Isle of Pines, *Curtiss* in 1904; Madruga, *Britton & Shafer* 721; *Eggers* 5361.

The three Wright specimens in the Grisebach Herbarium are: Eastern Cuba, 1860, no. "119=3426;" no. 299 of 1865; and eastern Cuba, 1859, no. 1537. In Sauvalle's Flora Cubana the number appears as 3829 instead of 2829. The specimen in the Gray Herbarium is numbered 3829.

4. **Sporobolus purpurascens** (Sw.) Hamilt. Prod. Fl. Ind. Occ. 5. 1825.
Agrostis purpurascens Sw. Prod. 25. 1788.
Vilfa grisebachiana Fourn. Mex. Pl. **2:** 98. 1886.
Sandy pine woods in large tufts, Pinar del Rio, October, *Wright* 3427a.

The two Wright specimens in the Grisebach Herbarium are: no. "907=3427" from western Cuba, 1863, and no. "885=3427", 1863. The type of Swartz's species is at Stockholm; the spikelets are 2.5 mm. long. Fournier noticed the difference between the two species (*S. cubensis* and *S. purpurascens*) distributed by Wright under 3427, but described as new the one already named. *Wright* 3427a in the Gray Herbarium is from "savannas, Chirigote, July 11."

5. **Sporobolus virginicus** (L.) Kunth, Rev. Gram. **1:** 67. 1829.
Agrostis virginica L. Sp. Pl. 63. 1753.
Wright 291; *Wright* 2830 in National Herbarium; Habana, *Baker* HC 1810, *Leon* 284; Mariel, *Palmer & Riley* 736; Isle of Pines, *Palmer & Riley* 955, 1122; Matanzas, *Britton & Wilson* 151 in Herb. N. Y. Bot. Gard.

The Grisebach specimen is no. 291 in 1865, "Seashore, Matanzas, July 8." In Sauvalle's Flora Cubana this is numbered 3830, which is probably correct, as the specimen in the Gray Herbarium is also numbered 3830.

54. CAPRIOLA Adans. Fam. Pl. **2:** 31, 532. 1763.[a]

1. **Capriola dactylon** (L.) Kuntze, Rev. Gen. Pl. **2:** 764. 1871.
Panicum dactylon L. Sp. Pl. 58. 1753.
Cynodon dactylon Pers. Syn. **1:** 85. 1805.
Wright 3814; Santiago de las Vegas, *Baker* HC 386, *Hitchcock* in 1906; Habana, *Leon* 290; Cienfuegos, *Combs* 540 in Gray Herbarium.

55. CHLORIS Sw. Prod. 25. 1788.

Spikelets awnless; spikes dark brown.....6. *C. petraea.*
Spikelets awned; spikes green or yellow.
  Spikelets distant, diverging; spikes delicate, scarcely 1-sided.2. *C. cruciata.*
  Spikelets contiguous; spikes not delicate, conspicuously 1-sided.

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[a] There is some question as to the standing of Capriola as a genus, since it is based upon "Gramen dactylon offic." (Adans. Fam. **2:** 31 and 532. 1763.) But since Linnæus cites under *Panicum dactylon* "Gramen dactylon, radice repente, S. officinarum Scheuch. Gram. 104" we may assume that Adanson wished to base his genus on this species, though he does not quote a definite author.

Upper floret truncate-dilated.
- Awns 1 to 2 mm. long; lower lemma long-ciliate on the keel and lateral veins, but not at apex.....1. *C. ciliata.*
- Awns, or some of them, 5 mm. long or more; lower lemma ciliate on the upper part of marginal nerves, not on keel.....5. *C. paraguaiensis.*

Upper floret narrowed toward apex.
- Lower lemma strongly ciliate at apex with tuft of hairs 2 mm. long.....3. *C. elegans.*
- Lower lemma only pubescent at apex.
  - Lower lemma 3 mm. long; blades short and flat, abruptly rounded at apex.....7. *C. radiata.*
  - Lower lemma 2 mm. long; blades mostly involute-pointed.....4. *C. eleusinoides.*

1. **Chloris ciliata** Sw. Prod. 25. 1788.

Trinidad, May 17, *Wright* 743; Vento, *Baker* HC 1184, *Curtiss* 600; Guanabacoa, *Leon* 185 in part; Santiago de las Vegas, *Tracy* 9115, *Hitchcock* in 1906; Triscornia 9085; Habana, *Tracy* 9106; Herradura, *Hitchcock* in 1906; Arroyo Apolo. *Leon* 574.

2. **Chloris cruciata** (L.) Sw. Prod. 25. 1788.

Agrostis cruciata L. Syst. Nat. ed. 10. **2:** 873. 1759.

Chloris brevigluma Wright, Anal. Acad. Cienc. Habana **8:** 200. 1871; Sauv. Fl. Cub. 191.

Bushy savannas, Hanabana, May 16, *Wright* 1549; Punta Brava, *Baker* HC 4067; Guanabacoa, *Baker* HC 2927, *Curtiss* 584, *Hitchcock* in 1906; Madruga, *Britton & Shafer* 604 in Herb. N. Y. Bot. Gard.

There are three Wright specimens of this species in the Grisebach Herbarium: Nos. "917=1548" and "932=1548" from western Cuba, 1863, and no. 1549 from eastern Cuba, 1859. The type of *C. brevigluma* is in the Gray Herbarium with printed label for 1860–64, no. 1548. In Sauvalle's Flora Cubana the type is misprinted "1848 p. p." Wright seems to have distinguished his species from *C. eleusinoides* mounted on the same sheet (*Wright* 1549), which he regarded as the true *C. cruciata*. Wright's type matches his no. 1549 in the National Herbarium.

3. **Chloris elegans** H. B. K. Nov. Gen. & Sp. **1:** 166. 1816.

Vento, *Shafer* 483, *Baker* HC 1183; Madruga, *Britton & Shafer* 725; Mazarra, *Baker* HC 4023.

The type of this has not been examined, but the specimens cited above agree well with the plate accompanying the original description.[a]

4. **Chloris eleusinoides** Griseb. Fl. Brit. W. Ind. 539. 1864.

Chloris eleusinoides vestita Greenman in Combs, Trans. Acad. St. Louis **7:** 477. 1897.

Sandy pine woods, La Griza, January, *Wright* 3819; *Wright* 3818; *Wright* 1548; *Baker* HC 4067; La Magdalena, *Baker* Pl. Trop. Am. 4; Havana, *Leon* 287; Herradura, *Hitchcock* in 1906; Cienfuegos, *Combs* 631 in Gray Herbarium.

The Grisebach specimen is from eastern Cuba, 1859, no. 1548. Nos. 1548 and 1549, in the Engelmann Herbarium, both from eastern Cuba, 1860, are *Chloris eleusinoides*. No. 1549 in the Gray Herbarium is also this species (Monte Verde, eastern Cuba in 1859).

Combs's 631, from Cienfuegos, in the Gray Herbarium is the type of *C. eleusinoides* variety *vestita*. It differs from Grisebach's type in being somewhat more pubescent.

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[a] Op. cit. *pl. 49.*

5. **Chloris paraguaiensis** Steud. Syn. Pl. Glum. **1:** 204. 1854.

Andropogon barbatum L. Mant. **2:** 302. 1771, not L. 1759.

Chloris barbata Sw. Fl. Ind. Occ. **1:** 200. 1797 (based on *Andropogon barbatum* L. Mant.), not *C. barbata* Nash, Bull. Torr. Club **25:** 443. 1898 (based on *Andropogon barbatum* L. Syst.).

Habana, *Baker* HC 3388, *Tracy* 9113, *Palmer & Riley* 1150; Triscornia, *Tracy* 9084, *Hitchcock* in 1906, *Baker* HC 1864; Matanzas, *Britton* 491; Regla, *Shafer;* Vedado, *Baker* HC 1441; Playa de Cojimar, *Hitchcock* in 1906; Santiago de Cuba, *Millspaugh* 1064; Mariel, *Palmer & Riley* 725; Herradura, *Hitchcock* in 1906. In the herbarium of the New York Botanical Garden: Isle of Pines, *Curtiss* in 1904; Santiago de Cuba, *Underwood & Earle* 101.

6. **Chloris petraea** Sw. Prod. 25. 1788.

Eustachys petraea (Sw.) Desv. Nuov. Bull. Soc. Philom. **2:** 189. 1810.

Wright 293; *Wright* 3817 in National Herbarium; Cojimar, *Baker* HC 2867, *Hitchcock* in 1906; Habana, *Liebmann* 235; Isle of Pines, *Palmer & Riley* 969. In the herbarium of the New York Botanical Garden: Matanzas, *Britton & Shafer* 16; Isle of Pines, *Curtiss* in 1904.

The specimen in the Grisebach Herbarium is numbered 293, 1865. The number 3719, listed in Sauvalle's Flora Cubana under this species, is probably an error. Doell changes the name of *C. petraea* Sw. to *C. swartziana*[a] because of the different *C. petraea* Thunb.[b]

7. **Chloris radiata** (L.) Sw. Prod. 26. 1788.

Agrostis radiata L. Syst. Nat. ed. 10. **2:** 873. 1759.

Eastern Cuba, 1856–57, *Wright* 742; Santiago de las Vegas, *Tracy* 9110, *Hitchcock* in 1906; Playa de Cojimar, *Hitchcock* in 1906; Triscornia, *Hitchcock* in 1906; Habana, *Leon* 558.

56. BOUTELOUA Lag. Var. Cienc. **2**[4]: 134. 1805.[c]

Primary racemes few, distant on the main axis (5 to 15 mm. apart); blades 1 to 2 mm. wide.....1. *B. americana.*
Primary racemes numerous, secund, approximate (1 to 5 mm. apart); blades 3 to 5 mm. wide.....2. *B. disticha.*

1. **Bouteloua americana** (L.) Scribn. Proc. Acad. Phila. **1891:** 306. 1891.

Aristida americana L. Syst. Nat. ed. 10. **2:** 879. 1759.

Bouteloua litigiosa Lag. Gen. & Sp. Nov. 5. 1816.

Bouteloua humboldtiana Griseb. Mem. Amer. Acad. n. ser. **8:** 532. 1862.

Bouteloua porphyrantha Wright, Anal. Acad. Cienc. Habana **8:** 201. 1871; Sauv. Fl. Cub. 192.

Wright 165, 166, 3816; *Wright* 3815 and 734 in Gray Herbarium; Triscornia, *Baker* HC 1873, *Tracy* 9088, *Hitchcock* in 1906; Habana, *Curtiss* 546, *Leon* 293; Colima, *Baker* HC 1978; La Magdalena, *Baker* HC 3621, Regla, *Shafer* 489; Guanabacoa, *Leon* 38; Marianao, *Leon* 231; Cojimar, *Hitchcock* in 1906.

The Grisebach specimens are *Wright* 161 of 1865, "Bushy savannas, Hanabana, June 1," and 739, from eastern Cuba, 1859. The specimens cited above agree with the Linnæan type, which is not *Aristida dispera* Trin. as stated by Munro.[d]

2. **Bouteloua disticha** (H. B. K.) Benth. Journ. Linn. Soc. **19:** 105. 1882.

Polydon distichus H. B. K. Nov. Gen. & Sp. **1:** 175. 1816.

Madruga, *Curtiss* 537; Habana, *Leon* 299.

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[a] In Mart. Fl. Bras. **2**[3]: 68. 1878.

[b] Prod. 20. 1794.

[c] Botelua in the original.

[d] Proc. Linn. Soc. Bot. **6**: 49. 1862.

57. ELEUSINE Gaertn. Fruct. & Sem. 1: 7. *pl. 1.* 1788.

1. **Eleusine indica** (L.) Gaertn. Fruct. & Sem. **1:** 8. 1788.
Cynosurus indicus L. Sp. Pl. 72. 1753.

Saline flats, Matanzas, July 4, *Wright* 744; Santiago de las Vegas, *Baker* HC 513, 1139, *Hitchcock* in 1906; Puentes Grandes, *Leon* 278; Habana, *Leon* 294; Guanajay, *Palmer & Riley* 817; Santiago de Cuba, *Millspaugh* 1111; Cienfuegos, *Combs* 260 in Gray Herbarium; Isle of Pines, *Curtiss* in 1904 in Herb. N. Y. Bot. Gard.

The Grisebach specimen is no. 277 of 1865. The Sauvalle specimen also bears the secondary number 277.

58. DACTYLOCTENIUM Willd. Enum. 1029. 1809.

1. **Dactyloctenium aegyptium** (L.) Richt. Pl. Eur. **1:** 68. 1870.
Cynosurus aegyptius L. Sp. Pl. 72. 1753.

Pine woods, Nueva Filipina, *Wright* 3821 (misprinted 3831 in Sauvalle's Flora Cubana); Habana, *Leon* 289, 554, *Baker* HC 1795, *Curtiss* 636; Puentes Grandes, *Leon* 273; Triscornia, *Hitchcock* in 1906; Cojimar, *Hitchcock* in 1906; Batabano, *Baker* HC 3919; Cienfuegos, *Combs* 513 in Gray Herbarium.

59. LEPTOCHLOA Beauv. Agrost. 71. *pl. 15. f. 1.* 1812.

Spikelets 2 to 4-flowered, imbricated, on one side of the panicle branches.
- Upper glume as long as lower lemma; sheaths papillose-hispid...2. *L. mucronata.*
- Upper glume shorter than lower lemma; sheaths smooth.....4. *L. virgata.*

Spikelets several-flowered; inflorescence not conspicuously 1-sided.
- Inflorescence a single spike.....3. *L. spicata.*
- Inflorescence of several spike-like racemes.....1. *L. fascicularis.*

1. **Leptochloa fascicularis** (Lam.) Gray, Man. 588. 1848.
Festuca fascicularis Lam. Tabl. Encycl. **1:** 189. 1791.

In tufts, ditches, Matanzas, July 6, *Wright* 303; *Wright* 3822; *Wright* 3812 in National Herbarium; Batabano, *Baker* HC 2762, *Hitchcock* in 1906. In the herbarium of the New York Botanical Garden: Matanzas, *Britton & Wilson* 176; Batabano, *Shafer* 488.

The Grisebach specimen collected in 1865 is numbered 303.

2. **Leptochloa mucronata** (Michx.) Kunth, Rev. Gram. **1:** 91. 1829.
Eleusine mucronata Michx. Fl. Bor. Amer. **1:** 65. 1803.

In fields, Punta de Palma, September, *Wright* 740; Habana, *Britton & Wilson* 509, *Hitchcock* in 1906; Isle of Pines, *Curtiss* 508; Guanabacoa, *Leon* 580.

In the National Herbarium are two Wright specimens of this, numbered 740 and 741. The latter number is probably an error, the label having been interchanged with that of a specimen of *L. fascicularis*. In the Gray Herbarium there are two sheets numbered 741, of which one is *L. filiformis* from "Cultivated ground, Valestina, Nov. 12," 1865, the other *L. virgata.*

The type of *Festuca filiformis* Lam.[a] "ex Amer. merid. Comm. D. Richard" upon which *Leptochloa filiformis* Beauv. is presumably based, has not been examined, and the description is insufficient for identification. This name may be found to apply to this species.

3. **Leptochloa spicata** (Nees) Scribn. Proc. Acad. Phila. **1891:** 304. 1891.
Bromus spicatus Nees, Agrost. Bras. 471. 1829.
Triscuspis simplex Griseb. Mem. Amer. Acad. n. ser. **8:** 532. 1862.
Wright 1551.

There are two Wright specimens in the Grisebach Herbarium, both from eastern Cuba, no. 114 of 1860 and no. 1551 of 1859. Wright's 1551 is represented in the Gray

[a] Tabl. Encycl. **1:** 191. 1791.

Herbarium by two specimens, one of 1860–64, labeled "Savannas, Hoto del Medio, Aug. 25," the other, Monte Verde, 1859, labeled "On rocks exposed to the sun, covered with a thin stratum of earth, on the brink of the Farallones, Oct. 11."

4. **Leptochloa virgata** (L.) Beauv. Agrost. 166. 1812.
Cynosurus virgatus L. Syst. Nat. ed. 10. **2:** 876. 1759.
Leptochloa perennis Hack. Inf. Anal. Est. Agr. Cuba **1:** 411. 1906.
Wright 283, 741, 3436; Habana, *Tracy* 9108, *Curtiss* 607; La Magdalena, *Baker* HC 3635; Matanzas, *Britton* 543; Santiago de las Vegas, *Hitchcock* in 1906; Herradura, *Baker* HC 765, 2786, *Tracy* 9061, *Hitchcock* in 1906; Cayamas, *Baker* HC 4617; Cienfuegos, *Pringle* 62, *Combs* 256 in Gray Herbarium; San Diego de los Baños, *Palmer & Riley* 543; Santiago de Cuba, *Pollard, Palmer & Palmer* 273; Marianao, *Leon* 560; Yumury Mountains, *Rugel* 193 in Gray Herbarium. In the herbarium of the New York Botanical Garden are: Santiago de Cuba, *Palmer* 273; Baracoa, *Underwood & Earle* 1397; Madruga, *Britton & Shafer* 746.

Wright's 741 in the Sauvalle Herbarium has also the secondary number 278. In the Grisebach Herbarium are three specimens of this: "In roads, probably introduced, La Ferruina, June 24," no. 278 of 1865; no. 3436 of 1860–64; no. "117=740" from eastern Cuba, 1860. One of the Wright specimens bearing the number 741 in the Gray Herbarium (eastern Cuba, 1856–57) is *L. virgata;* the other is *L. mucronata*. Wright's 3436 in the Gray Herbarium is from Mayarí Abajo, Aug. 2. Another specimen in the Gray Herbarium without number is from "Savannas, Retiro, Oct. 11."

60. OPIZIA Presl, Rel. Haenk. 1: 293. *t. 41. f. 1.* 1830.

1. **Opizia stolonifera** Presl, Rel. Haenk. **1:** 293. 1830.
Cojimar, *Baker* HC 2898, 5076, *Hitchcock* in 1906; Pinar del Rio, *Shafer* 482; Habana, *Curtiss* 571, *Leon* 274, 288.

61. PAPPOPHORUM Schreb.; Vahl, Symb. Bot. 3: 10. 1794.[a]

1. **Pappophorum laguroides** Schrad. in Schult. Mant. **2:** 342. 1824.
Triscornia, *Hitchcock* in 1906.

62. GYNERIUM H. B. K. Pl. Aequin. 2: 112. *t. 115.* 1809.

1. **Gynerium sagittatum** (Aubl.) Beauv. Agrost. 138. 1812.
Saccharum sagittatum Aubl. Pl. Guian. **1:** 50. 1775.
Gynerium saccharoides H. B. K. Pl. Aequin. **2:** 112. 1809.
Retiro, *Wright* 224; *Wright* 3477; Santiago de las Vegas, *Baker* HC 1297, 5017, *Wilson* 237; San Diego de los Baños, *Palmer & Riley* 616. In the herbarium of the New York Botanical Garden are the following: Matanzas, *Britton & Shafer* 265, *Britton & Wilson* 205; Santiago de Cuba, *Taylor* 145; Calvario, *Leon* 569.

In the Grisebach Herbarium are *Wright* 3477, 1860–64, and 1560 of 1859. Wright's 1560 in the Gray Herbarium is from Monte Verde; no. 3477 is labeled "10–15 ft. panicle 4–6 ft. On stony ledges in the river Tacotaco, Sept. 13."

63. ERAGROSTIS Host, Icon. Gram. Austr. 4: 14. *pl. 14. f. 11.* 1809.[b]

Flowers dioecious; creeping annuals ..... 7. *E. hypnoides.*
Flowers perfect, stems not creeping.
Palea prominently ciliate; annuals.
Panicle contracted, spike-like ..... 2. *E. ciliaris.*
Panicle open ..... 8. *E. plumosa.*

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[a] Schreb. Gen. **2:** 787. 1791, without citation of species.

[b] Until the genus Eragrostis is monographed the Cuban species must remain somewhat uncertain.

Palea not prominently ciliate.
Annual; blades flat; panicle open but not very diffuse ..9. *E. tephrosanthes*.
Perennial.
Plants low, 10 to 20 cm. high; blades involute, panicle not diffuse.
Spikelets 3 to 5-flowered; pedicels glutinous; palea somewhat ciliate .....6. *E. glutinosa*.
Spikelets many-flowered; pedicels not glutinous; palea only minutely ciliate.....3. *E. cubensis*.
Plants tall; blades flat; panicles very diffuse.
Spikelets less than 2 mm. long, 1 or 2-flowered..1. *E. airoides*.
Spikelets 5 to 10 mm. long, several-flowered.
Spikelets lanceolate; pedicels shorter than spikelets; panicle branches lax; culms 1 meter or more tall.....5. *E. excelsa*.
Spikelets linear; pedicels mostly longer than spikelets; panicle branches stiffly spreading; culms rarely over 60 cm. tall.....4. *E. elliottii*.

1. **Eragrostis airoides** Nees, Agrost. Bras. 509. 1829.
In savannas, Chirigote, November 2, *Wright* 3827.

2. **Eragrostis ciliaris** (L.) Link, Hort. Berol. **1:** 192. 1827.
Poa ciliaris L. Syst. Nat. ed. 10. **2:** 875. 1759.
Wright 155; *Wright* 1550; Cojimar, *Hitchcock* in 1906; Batabano, *Baker* HC 3912; Guines, *Baker* HC 3561; Robles, *Shafer* 40; Guanabacoa, *Leon* 196; Puentes Grandes, *Leon* 281; Herradura, *Baker* HC 2778; Matanzas, *Palmer & Riley* 13; El Guama, *Palmer & Riley* 185; Santiago de Cuba, *Millspaugh* 1062; Cienfuegos, *Combs* 480 in Gray Herbarium. In the herbarium of the New York Botanical Garden are the following: Isle of Pines, *Curtiss* in 1904; Matanzas, *Britton & Shafer* 555; Santiago de Cuba, *Underwood & Earle* 172.
The Wright specimen in the National Herbarium bears the secondary number 305. In the Grisebach Herbarium are two Wright specimens of this, no. 305 of 1865 and no. 1550 from eastern Cuba, 1859. In the Gray Herbarium are two specimens of *Wright* 1550, one of 1860–64, the other from Josephina, near Monte Verde, 1859.

3. **Eragrostis cubensis** sp. nov.
Culms cespitose from a perennial base, numerous, slender and wiry, smooth, erect or spreading, 10 to 20 cm. long, or occasionally decumbent and as much as 30 cm. long; sheaths smooth, striate; blades filiform-convolute, glabrous, or very sparsely pilose, the base and mouth of sheath pilose, 2 to 3 cm. long, or those on the innovations as much as 10 cm. long; panicles nearly simple, 2 to 4 cm. long, the branches 1 to 2 mm. long, bearing a single spikelet, or the lowermost as much as 1 cm. long, bearing 2 to 4 spikelets; spikelets linear, 5 to 15 mm. long, 1 mm. wide, as much as 40-flowered; glumes smooth, nearly equal, about 1 mm. long; lemma acute, 3-nerved, glabrous, keel smooth; palea minutely ciliate.
Isle of Pines, *Curtiss* 420 (type U. S. National Herbarium no. 522037); *Wright* 3424, 3825; Vedado, *Baker* HC 3456; Madruga, *Shafer* 68; La Magdalena, *Baker* Pl. Trop. Amer. 3; Herradura, *Tracy* 9097, *Baker* HC 2938, 4876, 4877, *Hitchcock* in 1906; Sagua, *Britton & Wilson* 382 in Herb. N. Y. Bot. Gard.
This has been confused with *E. bahiensis* Steud., which is a larger plant, 60 cm. or more tall. *E. berteroiana* (Schult.) Kunth, of Santo Domingo, has smaller spikelets with lemmas scabrous on the keel, as shown by a specimen from Kunth in Trinius's herbarium. The Grisebach specimen from Wright is numbered "938=3424," and is from western Cuba, 1863, "bushy swamps, Hanabana, May 16." Another

is from western Cuba, 1863, and is numbered 903. Wright's 3424 in the Gray Herbarium is from "savannas, Chirigote, July 13."

This is described and figured by Sloane,[a] and is cited as a synonym by Swartz under *Poa glutinosa* [b] and by Grisebach;[c] but *Poa glutinosa* Sw. is *Eragrostis sudans* Griseb., while Wullschlaegel's specimen from Jamaica, cited by Grisebach under *Eragrostis glutinosa*, is *E. elliottii* S. Wats.

4. **Eragrostis elliottii** S. Wats. Proc. Amer. Acad. **25:** 140. 1890.

Poa nitida Ell. Bot. S. C. & Ga. **1:** 162. 1816, not *Poa nitida* Lam. 1791, nor *Eragrostis nitida* Link, 1827.

Eragrostis macropoda Pilger in Urban, Symb. Antill. **4:** 106. 1903.

Savannas, Retiro, June, *Wright* 3423; without data, *Wright;* Cojimar, *Baker* HC 5332; Pinar del Rio, *Baker & Abarca* HC 3735, *Palmer & Riley* 441; Herradura, *Tracy* 9096, *Hitchcock* in 1906; Isle of Pines, *Taylor* 25. In the herbarium of the New York Botanical Garden are: Sagua, *Britton & Wilson* 320; Isle of Pines, *Curtiss* in 1904.

The Grisebach specimens are nos. 155, 155a, 155b, all of 1865. Wright's 3423 in the Gray Herbarium is from "lagunas, Vueltabajo, July 24."

Pilger [d] states that *E. macropoda* differs from *E. nitida* (Ell.) Chapm. in having long-peduncled spikelets. However, the type of *Poa nitida* Ell. has long-peduncled spikelets and is well matched by *Wright* 3423.

5. **Eragrostis excelsa** Griseb. Cat. Pl. Cub. 227. 1866.

Wright 3425.

The Grisebach specimen is no. 3425, 1860–64. Wright's 3425 in the Gray Herbarium is from "sand beaches by the seaside, Toscano, Oct. 30."

6. **Eragrostis glutinosa** (Sw.) Trin. Mem. Acad. Petersb. VI. **1:** 397. 1831.

Poa glutinosa Sw. Prod. 26. 1788.

Eragrostis sudans Griseb. Cat. Pl. Cub. 227. 1866.

Wright 3422.

The Grisebach specimen is from eastern Cuba, 1860, numbered "112=3422." The Sloane [e] figure cited by Swartz is *Eragrostis cubensis* Hitchc.

The type of Swartz's species in the Stockholm Herbarium is from Jamaica. In the Trinius Herbarium is a duplicate from Swartz, which is the basis of *Eragrostis glutinosa* Trin.

7. **Eragrostis hypnoides** (Lam.) B. S. P. Prel. Cat. **N. Y. 69. 1888.**

Poa hypnoides Lam. Tabl. Encycl. **1:** 185. 1791.

Poa reptans Michx. Fl. Bor. Amer. **1:** 69. 1803.

Eragrostis reptans Nees, Agrost. Bras. 514. 1829.

Around lagunas, Hanabana, May 20, *Wright* 156; *Wright* 3826; Laguna de Castellano, *Baker* HC 1356; Isle of Pines, *Curtiss* 391. The following are in the herbarium of the New York Botanical Garden: Habana, *Baker* 4328; Santiago de Cuba, *Hamilton* 214; Baracoa, *Underwood & Earle* 1387.

The Grisebach specimen from Wright is no. 156 of 1865.

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[a] Hist. Jam. **1:** *pl. 71. f. 2.* 1707.

[b] Sw. Prod. 26. 1788.

[c] Fl. Brit. W. Ind. 532. 1864.

[d] Loc. cit.

[e] Hist. Jam. **1:** *pl. 71. f. 2.* 1707.

8. **Eragrostis plumosa** (Retz.) Link, Hort. Berol. **1:** 192. 1827.[a]
Poa plumosa Retz. Obs. **4:** 20. 1786.
Santiago de las Vegas, *Baker* HC 1030; Habana, *Hitchcock* in 1906; Puentes Grandes, *Leon* 277; Santiago de Cuba, *Palmer* 374, *Underwood & Earle* 173 in Herb. N. Y. Bot. Gard.

9. **Eragrostis tephrosanthes** Schult. Mant. **2:** 316. 1824.
Wright 745; Santiago de las Vegas, *Baker* HC 3666; Vento, *Wilson* 1182; Carduas, *Britton & Wilson* 156a; Guanabacoa, *Leon* 205; Puentes Grandes, *Leon* 276; Habana, *Leon* 295, *Hitchcock* in 1906; Cojimar, *Hitchcock* in 1906; Herradura; *Tracy* 9057, *Hitchcock* in 1906; Cienfuegos, *Combs* 266 in Gray Herbarium; Matanzas, *Britton & Shafer* 557 in Herb. N. Y. Bot. Gard.

The Grisebach specimen is from Wright, 1860–64, without number. In the Gray Herbarium is a Wright specimen without number, with an 1860–64 label, and two specimens numbered 745 from eastern Cuba, one collected in 1856–57, the other in 1859.

This species is similar to *E. pilosa* (L.) Beauv., but the spikelets are larger and broader.

64. UNIOLA L. Sp. Pl. 71. 1753.

Spikelets 15 mm. or more long, 7 to 10 mm. wide .....1. *U. paniculata.*
Spikelets 2 to 3 mm. long, 1 to 2 mm. wide .....2. *U. virgata.*

1. **Uniola paniculata** L. Sp. Pl. 71. 1753.
Wright 2823 [error for 3823].

The Grisebach specimen is labeled "Sandy sea-beach, Cananova, July 15," no. 280, 1865. In Sauvalle's Flora Cubana this is numbered 3823, which is apparently correct. The specimen in the Gray Herbarium is numbered 3823.

2. **Uniola virgata** (Poir.) Griseb. Fl. Brit. W. Ind. 531. 1864.
Poa virgata Poir. in Lam. Encycl. **5:** 78. 1804.
Punta Brava, *Rugel* 870 in Grisebach Herbarium; also in the Gray Herbarium and that of the New York Botanical Garden.

65. DISTICHLIS Raf. Journ. Phys. **89:** 104. 1819.

1. **Distichlis spicata** (L.) Greene, Bull. Calif. Acad. Sci. **2:** 415. 1887.
Uniola spicata L. Sp. Pl. 71. 1753.
Vedado, *Baker* HC 3455; Batabano, *Shafer* 117, *Hitchcock* in 1906.

66. ARTHROSTYLIDIUM Rupr. Mem. Acad. Petersb. VI. **5:** 117. 1839.

Blades capillary.....2. *A. capillifolium.*
Blades flat.
  Blades less than 5 cm. long.
    Sheaths puberulent, bristles at summit inconspicuous...6. *A. sarmentosum.*
    Sheaths glabrous, bristles at summit elongated.
      Blades about 5 mm. wide; spikelets reflexed.....4. *A. distichum.*
      Blades about 2 mm. wide; spikelets appressed.....5. *A. fimbriatum.*
  Blades 10 cm. or more long.
    Blades puberulent beneath, often reflexed.....7. *A. urbanii.*
    Blades glabrous beneath, erect.
      Blades 5 to 10 mm. wide.....3. *A. cubense.*
      Blades about 2 mm. wide, elongated.....1. *A. angustifolium.*

[a] Trimen (Fl. Ceylon **5:** 291. 1900) considers this different from *E. tenella* (L.) Roem. & Schult. (*Poa tenella* L., *Poa amabilis* L.) and includes it as *E. tenella plumosa* (Retz.) Stapf; Fl. Brit. Ind. **7:** 315. 1896.

1. **Arthrostylidium angustifolium** Nash, Torreya **3:** 172. 1903.
Baracoa, *Underwood & Earle* 941 in Herb. N. Y. Bot. Gard.

2. **Arthrostylidium capillifolium** Griseb. Mem. Amer. Acad. n. ser. **8:** 531. 1862.
Without data, *Wright;* Madruga, *Shafer* 11; Santiago de Cuba, *Taylor* 218, *Hamilton* 212, both in Herb N. Y. Bot. Gard.

The Wright specimen in the Grisebach Herbarium is no. 738 from eastern Cuba in 1856–57. Since the above specimen is the only Arthrostylidium in the Sauvalle Herbarium without number, it is probably the one listed under no. 2744 in Sauvalle's Flora Cubana, "Arthrostylidium sp.? (sine numero)."

In the Gray Herbarium are two specimens of *Wright* 738, both from eastern Cuba, one with flowers, collected in 1856–57, the other sterile, "In dense woods, ascending on trees and bushes, 10–20 ft., Monte Verde, Aug. 22, 1859."

3. **Arthrostylidium cubense** Rupr. Mem. Acad. Petersb. VI. **5:** 118. 1839.
"Pendant on cliffs, pinales, Nov.," "Banks of river San Sebastian, Pinar del Rio, Dec.," *Wright* 3811; without locality, *Wright* 3809.

The two Grisebach specimens are labeled "Subscandent, 10 ft., savannas of Guanacaro, near rivulets, Aug. 3," no. 307, 1865, and "Savannas of Guanacaro, July 31," no. 288. The Wright specimens agree with the type in the Trinius Herbarium.

4. **Arthrostylidium distichum** Pilger in Urban, Symb. Antill. **2:** 342. 1901.
"In dense woods, Oct. 19," "Damp woods, Rangel, Nov. 14," *Wright* 3808.

5. **Arthrostylidium fimbriatum** Griseb. Mem. Amer. Acad. n. ser. **8:** 531. 1862.
Eastern Cuba in 1859, *Wright* 1554 in Grisebach Herbarium. This number in the Gray Herbarium is labeled, "In dense woods, 1–3 ft. high, Dec. 23," from Monte Verde, 1859. A sterile specimen in the herbarium of the New York Botanical Garden from Santiago de Cuba, *Taylor* 415, appears to be this species.

6. **Arthrostylidium sarmentosum** Pilger in Urban, Symb. Antill. **4:** 108. 1903.
Santiago de Cuba, *Hamilton* 213 in Herb. N. Y. Bot. Gard.

7. **Arthrostylidium urbanii** Pilger in Urban, Symb. Antill. **2:** 339. 1901.
Wright 3810.

In the Gray Herbarium there are two sterile specimens of what appear to be this species, numbered 41 and 288.

Gramen sp., *Wright* 3894. This number is represented by an unidentifiable fragmentary specimen from which the spikelets have fallen. It is listed in Sauvalle's Flora Cubana as "*Muhlenbergia spicata* Munn."

GRASSES OF GRISEBACH'S CATALOGUE.[a]

1. Arthrostylidium fimbriatum Gr. Wr. 1554. See p. 246.
2. Arthrostylidium cubense Rupr. Wr. a. 1865 (307).[b] See p. 246.
3. Arthrostylidium capillifolium Gr. Wr. 738. See p. 246.
4. Arundo saccharoides Gr. Wr. 1560, 3477. See Gynerium sagittatum, p. 242.
5. Uniola virgata Gr. Rug. 870. See p. 245.
6. Uniola paniculata L. Wr. a. 1865 (280). See p. 245.
7. Eragrostis excelsa Gr. Wr. 3425. See p. 244.
8. Eragrostis prolifera Steud. Wr. a. 1865 (155a). See E. elliottii, p. 244.
9. Eragrostis pilifera Benth. Wr. a. 1865 (156b). See E. elliottii, p. 244.

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[a] Catalogus Plantarum Cubensium, 1866.

[b] The numbers in parentheses refer to the secondary numbers on the labels in Grisebach's herbarium. The other numbers and the names are as given by Grisebach. **The "a" stands for anno.**

10. Eragrostis glutinosa Tr. Wr. 3423. See E. elliottii, p. 244.
11. Eragrostis pilosa P. B. Wr. 745. See E. tephrosanthes, p. 245.
12. Eragrostis bahiensis Schrad. Wr. 3424. See E. cubensis, p. 243.
13. Eragrostis reptans Ns. Wr. a. 1865 (156). See E. hypnoides, p. 244.
14. Eragrostis sudans Gr. Wr. 3422. See E. glutinosa, p. 244.
15. Eragrostis ciliaris Lk. Wr. 1550. See p. 243.
16. "Festuca laxiflora Rich." (Rich.) E. [No specimen found.]
17. Sporobolus virginicus Kth. Wr. a. 1865 (291). See p. 238.
18. Sporobolus domingensis Kth. Wr. a. 1865 (300). See Sporobolus argutus, p. 237.
19. Sporobolus purpurascens Ham. Wr. 3427. See p. 238, and S. cubensis, p. 237.
20. Sporobolus indicus R. Br. Wr. 1537. See p. 237.
21. Sporobolus jacquemontii Kth. Wr. 3426. See Sporobolus indicus, p. 237.
22. Reynaudia filiformis Kth. Wr. 3428. See p. 235.
23. Aristida stricta Mich. Wr. 736. See Aristida curtifolia, p. 235. Wr. 737. See A. mohrii, p. 236. Wr. 3430. See A. refracta, p. 236.
24. Aristida refracta Gr. Wr. 3431. See p. 236.
25. Aristida purpurascens Poir. Wr. 3432. See Aristida erecta, p. 236.
26. Aristida interrupta Cav. Wr. 3433. See Aristida mohrii, p. 236.
27. "Streptachne cubensis Rich." See Aristida scabra, p. 236.
28. Milium lanatum R. S. Wr. 3429. See Leptocoryphium lanatum, p. 207.
29. Leersia hexandra Sw. Wr. 3434. See Homalocenchrus hexandrus, p. 234.
30. Leersia monandra Sw. Wr. 731. See Homalocenchrus hexandrus, p. 234.
31. Achlaena piptostachya Gr. Wr. 3487. See p. 235.
32. Olyra latifolia L. Rug. 873; Wr. a. 1865 (162). See p. 233. Variety arundinacea Tr. Wr. 746. See Olyra latifolia, p. 233.
33. Olyra pauciflora Sw. Wr. 732. See Lithachne pauciflora, p. 233.
34. Olyra pineti Wr. Wr. 1536. See Lithachne pineti, p. 233.
35. Olyra strephioides Gr. Wr. 3435. See Mniochloa strephioides, p. 233.
36. Pharus latifolius L. Wr. 733. See Pharus glaber, p. 234.
37. Pharus glaber Kth. Wr. 733b. See p. 234.
38. Bouteloua humboldtiana Gr. Wr. 734, 739. See Bouteloua americana, p. 240.
39. Leptochloa mucronata Kth. Wr. 740. See p. 241. Wr. 3436. See L. virgata, p. 242.
40. Leptochloa virgata P. B. Wr. 741. See p. 242.
41. Leptochloa fascicularis As. Gr. Wr. a. 1865 (303). See p. 241.
42. Tricuspis simplex Gr. Wr. 1551. See Leptochloa spicata, p. 241.
43. Chloris cruciata Sw. Wr. 1548, 1549. See p. 239.
44. Chloris eleusinoides Gr. See p. 239.
45. Chloris radiata Sw. See p. 240.
46. Chloris ciliata Sw. Wr. 743. See p. 239.
47. Chloris petraea Thunb. Wr. a. 1865 (293). See p. 240.
48. Dactyloctenium "aegyptiacum W." See D. aegyptium, p. 241.
49. Eleusine indica G. Wr. 744. See p. 241.
50. Cynodon dactylon Pers. See Capriola dactylon, p. 238.
51. Reimaria acuta Fl. Wr. 3437. See Reimarochloa brasiliensis, p. 198.
52. Paspalum compressum Ns. Wr. a. 1865 (168). See Axonopus compressus, p. 207.
53. Paspalum platyphyllum Gr. Wr. 3441, Wr. a. 1865 (174). See Brachiaria plantaginea, p. 212.
54. Paspalum conjugatum Berg. Wr. 767. See p. 201.
55. Paspalum lindenianum Rich. Wr. 3445. See P. rupestre, p. 206.
56. Paspalum nanum Wr. Wr. a. 1865 (176). See p. 204.
57. Paspalum distichum L. variety vaginatum Sw. Wr. 1546. See P. distichum, p. 202, and P. vaginatum, p. 206.
58. Paspalum notatum Fl. Wr. 3438. See P. minus, p. 203.
59. Paspalum filiforme Sw. Wr. 769. See p. 202.

60. Paspalum alterniflorum Rich. Rug. 894, Wr. a. 1865 (167). See p. 200.
61. Paspalum pulchellum Kth. Wr. 3439. See p. 205.
62. Paspalum dissectum L. Wr. 3440. See p. 202.
63. Paspalum setaceum Mich. Wr. 3442. See P. rigidifolium, p. 205.
64. Paspalum caespitosum Fl. Wr. 3443. See p. 201, and P. arenarium, p. 201.
    Wr. 3444. See p. 201, P. clavuliferum, p. 201, and P. rupestre, p. 206.
65. Paspalum glabrum Poir. Wr. a. 1865 (298). See p. 202.
66. Paspalum plicatulum Mich. Wr. 768. See p. 205.
67. Paspalum virgatum L. Wr. 3446. See p. 206.
    Variety stramineum Gr. Wr. a. 1865 (302). See P. virgatum, p. 206.
68. Paspalum paniculatum L. Wr. 766. See p. 204.
69. Paspalum densum Poir. Wr. 3447. See p. 202.
70. Digitaria filiformis Muhlenb. Wr. 1544. See Syntherisma filiformis, p. 209, and S. leucocoma, p. 209.
71. Digitaria pulchella Gr. Wr. 3448. See Mniochloa pulchella, p. 233.
72. Digitaria marginata Lk. Wr. 765. See Axonopus compressus, p. 207.
    Variety eriogona Lk. Wr. a. 1865 (178, 294). See Syntherisma sanguinalis, p. 209.
73. Digitaria setigera Rth. Wr. 764. See Syntherisma digitata, p. 209.
74. Eriochloa punctata Ham. Wr. 1542. See p. 208.
75. Stenotaphrum americanum Schrk. Wr. 3490. See Stenotaphrum secundum, p. 232.
76. Orthopogon "hirtellus R. Br." See Oplismenus hirtellus, p. 229.
77. Orthopogon loliaceus Spreng. Wr. 751. See Oplismenus hirtellus, p. 229.
78. Orthopogon setarius Spreng. Wr. 1543. See Oplismenus hirtellus, p. 229.
79. Panicum lolium Ns. Wr. 3449. See Mesosetum rottboellioides, p. 211.
80. Panicum paspaloides Pers. Wr. 761. See Panicum geminatum, p. 222.
81. Panicum colonum L. Wr. 752. See Echinochloa colona, p. 213.
82. Panicum crusgalli L. Rug. 889. See Echinochloa crusgalli, p. 213.
83. Panicum prostratum Lam. Rug. 195; Wr. 762. See P. reptans, p. 225.
84. Panicum grossarium L. Wr. a. 1865 (304). See P. adspersum, p. 217.
85. Panicum distantiflorum Rich. Wr. 3452. See p. 220.
86. Panicum fuscum Sw. Wr. 754. See P. fasciculatum, p. 221.
87. Panicum molle Sw. Wr. 1545. See P. numidianum, p. 224.
88. Panicum oryzoides Sw. Wr. 3466. See P. zizanioides, p. 228.
89. Panicum stenodes Gr. Wr. a. 1865 (192). See p. 227.
90. Panicum neuranthum Gr. Wr. 3453. See p. 224. Wr. a. 1865. See P. chrysopsidifolium, p. 218, and P. fusiforme, p. 222. β ramosum. Wr. 3454. See P. chrysopsidifolium, p. 218, and P. fusiforme, p. 222.
91. Panicum proliferum Lam. variety pilosum. Wr. a. 1865 (186). See P. chloroticum, p. 218. Variety strictum. Wr. 3456. See P. chloroticum, p. 218.
92. Panicum diffusum Sw. Wr. 1540. See p. 220.
93. Panicum durum Gr. Wr. 1539. See Alloteropsis dura, p. 211.
94. Panicum laxum Sw. Wr. 759. See p. 223.
    Variety variegatum Gr. Wr. 3450. See P. exiguiflorum, p. 221.
95. Panicum distichum Lam. variety pilosum Sw. Wr. 3451. See P. pilosum, p. 225.
96. Panicum maximum Jacq. See p. 224.
97. Panicum virgatum L. variety cubense. Wr. a. 1865. (183). See p. 227.
98. Panicum rudgei R. S. Wr. a. 1865 (281). See P. hirtivaginum, p. 223.
99. Panicum hirsutum Sw. Wr. a. 1865 (297). See p. 222.
100. Panicum lindenii Gr. See P. glutinosum, p. 222.
101. Panicum pallens Sw. Wr. 750. See Ichnanthus pallens, p. 228. 3468. See Ichnanthus mayarensis, p. 228. 750 posterius (887). See Ichnanthus pallens, p. 228.

102. Panicum divaricatum L. Wr. 747. See p. 220.
Variety puberulum Gr. Wr. 748. See P. divaricatum, p. 220.
103. Panicum rugelii Gr. Rug. 188; Wr. 3465. See p. 226.
104. Panicum sloanei Gr. Rug. 872; Wr. a. 1865 (269). See p. 226.
105. Panicum martinicense Gr. Wr. 3457. See P. grisebachii, p. 222.
106. Panicum glutinosum Sw. Wr. 757. See p. 222.
107. Panicum rugulosum Trin. variety hirtiglume Gr. Wr. 3455. See P. sellovii, p. 226.
108. Panicum cayennense Lam. Wr. (891). See p. 218.
109. Panicum brevifolium L. Wr. 1538. See P. trichoides, p. 227.
110. Panicum cyanescens Ns. Wr. 3458. See P. parvifolium, p. 225. Wr. 3459. See P. nitidum, p. 224.
111. Panicum tricanthum Ns. Wr. 753. See p. 227.
112. Panicum dichotomum L. variety glabrescens Gr. Wr. 3462. See P. erectifolium, p. 221. Wr. 3463. See P. caerulescens, p. 219; P. leucothrix, p. 224; P. tenue, p. 227; P. wrightianum, p. 228.
Variety nodiflorum Lam. Wr. 3460. See P. lancearium, p. 223. Wr. 3461. See P. chrysopsidifolium, p. 218; P. fusiforme, p. 222; P. lancearium, p. 223; P. pauciciliatum, p. 225.
113. Panicum viscidum Ell. Wr. 3467. See P. scoparium, p. 226.
114. Panicum exiguiflorum Gr. Wr. a. 1865. See p. 221.
115. Isachne leersioides Gr. Wr. 755. See p. 208. Wr. 756. See Panicum exiguiflorum, p. 221.
116. Hymenachne myurus P. B. Wr. 3469. See H. amplexicaulis, p. 212.
117. Hymenachne fluviatilis Ns. Wr. 3470. See Sacciolepis vilvoides, p. 213.
118. Hymenachne striata Gr. Wr. a. 1865 (198). See Sacciolepis striata, p. 213.
119. Setaria glauca P. B. Wr. 3472. See Chaetochloa imberbis, p. 230.
Variety imberbis R. S. Wr. a. 1865 (199). See Chaetochloa imberbis, p. 230.
Variety penicillata Gr. Wr. 3473. See Chaetochloa imberbis, p. 230.
120. Setaria onurus Gr. Wr. 3474. See Chaetochloa onurus, p. 230.
121. Setaria setosa P. B. Rug. 880; Wr. a. 1865 (287). See Chaetochloa onurus, p. 230.
122. Pennisetum setosum Rich. Wr. 3475. See p. 232.
123. Gymnothrix domingensis Spreng. Wr. 1547. See Pennisetum domingense, p. 232.
124. Cenchrus "myosuroides Kth." [No specimen found.]
125. Cenchrus echinatus L. Wr. 3476. See Cenchrus viridis, p. 231.
126. Cenchrus distichophyllus Gr. Wr. 3475. See p. 231.
127. Anthephora elegans Schreb. Wr. a. 1865 (308). See A. hermaphrodita, p. 196.
128. Echinolaena Sp. Wr. 760. See Ichnanthus wrightii, p. 229.
129. Arundinella martinicensis Tr. Wr. 3478. See p. 197.
130. Arundinella phragmitoides Gr. Wr. 3479. See A. deppeana, p. 196.
131. Arundinella cubensis Gr. Wr. 1552. See A. peruviana, p. 197.
132. Tricholaena "insularis Gr." See Valota insularis, p. 210.
133. Lappago aliena Spreng. Wr. 3489. See Nazia aliena, p. 196.
134. Manisuris granularis Sw. Wr. 1553. See Hackelochloa granularis, p. 191.
135. Rottboellia impressa Gr. Wr. a. 1865 (201). See Manisuris impressa, p. 191.
136. Andropogon secundus W. Wr. 1559. See Heteropogon contortus, p. 196.
137. Andropogon saccharoides Sw. Wr. 1556. See A. leucopogon, p. 193.
138. Andropogon "Ischaemum L. (Rich. Lind. 1818)." This specimen has not been examined.
139. Andropogon brevifolius Sw. Wr. 1558. See p. 192.
140. Andropogon tener Kth. Wr. 3482. See p. 194.
141. Andropogon gracilis Spreng. Wr. 1557, 3484. See p. 193.
142. Andropogon "scoparius Mich." Rich. See A. gracilis, p. 193.
143. Andropogon fastigiatus Sw. 3483, 3485. See p. 193.
144. Andropogon "nutans L." See Sorghastrum, p. 195. [No specimen found.]

145. Andropogon setosus Gr. Wr. a. 1865 (208). See Sorghastrum setosum, p. 195.
146. Anatherum domingense R. S. Wr. a. 1865 (202). See Andropogon leucostachys, p. 193.
147. Anatherum bicorne P. B. Wr. 770. See Andropogon bicorne, p. 192.
148. Anatherum macrurum Gr. Wr. 1555. See Andropogon glomeratus, p. 193.
149. Anatherum spathiflorum Gr. Wr. 3481. See Andropogon spathiflorus, p. 194.
150. Anatherum inerme Gr. Wr. 3480. See Andropogon spathiflorus, p. 194.
151. Sorghum halepense Pers. Wr. 3488. See Holcus halepensis, p. 195.
152. Imperata caudata Tr. Wr. 3486. See I. brasiliensis, p. 190.
153. Triscenia ovina Gr. Wr. 756. See p. 198.
154. Paratheria prostrata Gr. Wr. a. 1865 (207). See p. 232.

GRASSES OF SAUVALLE'S FLORA CUBANA.[a]

2721. Leersia monandra Sw. 731. See Homalocenchrus monandrus, p. 235.
2722. Leersia hexandra Sw. 3484. See Homalocenchrus hexandrus, p. 234.
2723. Oryza sativa L. 3838. See p. 234.
2724. Caryochloa bahiensis Steud. 3813. See Luziola bahiensis, p. 234.
2725. Uniola paniculata L. 3823. See p. 245.
2726. "Uniola virgata Gris" Rugel. See Uniola virgata, p. 245.
2727. Eragrostis excelsa Gris. 3425. See p. 244.
2728. Eragrostis nitida Chapm. 3423. See E. elliottii, p. 244.
2729. Eragrostis sudans Gris. 3422. See E. glutinosa, p. 244.
2730. Eragrostis ciliaris Link. 1550. See p. 243.
2731. Eragrostis poaeoides Beauv. 745, 3824. See E. tephrosanthes, p. 245.
2732. Eragrostis reptans Nees. 3826. See E. hypnoides, p. 244.
2733. Eragrostis bahiensis Schrad. 3424. See E. cubensis, p. 243.
2734. Eragrostis pilifera Benth. 3825. See E. cubensis, p. 243.
2735. Vilfa virginiana Beauv. 3830. See Sporobolus virginicus, p. 238.
2736. Vilfa indica Steud. 1537, 3829. See Sporobolus indicus, p. 237.
2737. Vilfa jacquemontii Kth. 3426. See Sporobolus indicus, p. 237.
2738. Vilfa arguta Nees. 3828. See Sporobolus argutus, p. 237.
2739. Vilfa purpurascens Beauv. 3427. See Sporobolus cubensis, p. 237, and S. purpurascens, p. 238.
2740. Poa airoides Kth. 3827. See Eragrostis airoides, p. 243.
2741. Arthrostylidium cubense Rupr. 3809, 3811. See p. 246.
2742. Arthrostylidium sp.? 3810. See A. urbanii, p. 246.
2743. Arthrostylidium sp.? 3808. See A. distichum, p. 246.
2744. Arthrostylidium sp. (sine numero). See A. capillifolium, p. 246.
2745. Arthrostylidium fimbriatum Gris. 1554. See p. 246.
2746. Arthrostylidium capillifolium Gris. 738. See p. 246.
2747. Gynerium saccharoides Kth. 1560, 3477. See G. sagittatum, p. 242.
2748. Leptochloa fascicularis Gray. 3812, 3822. See p. 241.
2749. Leptochloa virgata Beauv. 741, 3436. See p. 242.
2750. Leptochloa mucronata Kth. 740. See p. 241.
2751. Muhlenbergia spicata Munn. 3894. See Gramen sp., p. 246.
2752. Muhlenbergia capillaris Trin. 3836. See p. 237.
2753. Aristida scabra Kth. 3835. See p. 236.
2754. Aristida purpurascens Poir. 3432. See A. erecta, p. 236.
2755. Aristida dispersa Trin. 737. See A. mohrii, p. 236. 736. See A. curtifolia, p. 235. 3430, 3431. See A. refracta, p. 236. 3343.[b] See A. mohrii, p. 236.

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[a] See footnote, page 184.

[b] The discrepancies in numbers are doubtless due to typographical errors in Sauvalle's list.

2756. Reimaria acuta Flügge. 3437. See Reimarochloa brasiliensis, p. 198.
2757. Reinaudia filiformis Kth. 3428. See Reynaudia filiformis, p. 235.
2758. Eleusine indica Gaertn. 744. See p. 241.
2759. Dactyloctenium aegyptiacum Willd. 3831. See D. aegyptium, p. 241.
2760. Cynodon dactylon Pers. (sine numero). See Capriola dactylon, p. 238.
2761. Chloris ciliata Sw. 743. See p. 239.
2762. Chloris petraea Thunb. 3719. See p. 240.
2763. Chloris radiata Sw. 742. See p. 240.
2764. Chloris brevigluma sp. nov. 1848 p. p. See Chloris cruciata, p. 239.
2765. Chloris cruciata Sw. 1548 p. p., 1549. See C. eleusinoides, p. 239.
2766. Chloris beyrichiana Kth. 3819. See C. eleusinoides, p. 239.
2767. Chloris eleusinoides Gris. 3818. See p. 239.
2768. Bouteloua humboldtiana Gris. 739 p. p., 3815. See B. americana, p. 240.
2769. Bouteloua porphyrantha spec. nov. 739 p. p. 734, 3816. See B. americana, p. 240.
2770. Achlaena piptostachya Gris. 3487. See p. 235.
2771. Tricuspis simplex Gris. 1551. See Leptochloa spicata, p. 241.
2772. Olyra strephioides Gris. 3435. See Mniochloa strephioides, p. 233.
2773. Olyra pineti Wr. 1536. See Lithachne pineti, p. 233.
2774. Olyra pauciflora Sw. 732. See Lithachne pauciflora, p. 233.
2775. Olyra latifolia L. 746. See p. 233.
2776. Strephium? pulchellum sp. nov. 3448. See Mniochloa pulchella, p. 233.
2777. Milium lanatum R. & Sch. 3429. See Leptocoryphium lanatum, p. 207.
2778. Paspalum conjugatum Berg. 767. See p. 201.
2779. Paspalum rupestre Nees. 3445. See p. 206.
2780. Paspalum nanum Wr. 3842. See p. 204.
2781. Paspalum distichum L. 3854? See P. vaginatum, p. 206.
Variety vaginatum 1546. See P. vaginatum, p. 206, and P. distichum, p. 202.
2782. Paspalum alterniflorum Rich? 3841. See p. 200.
2783. Paspalum filiforme Sw. 769. See p. 202.
2784. Paspalum pulchellum Kth. 3439. See p. 205.
2785. Paspalum notatum Flügge. 3438. See p. 204 and P. minus, p. 203.
2786. Paspalum dissectum L. 3440. See p. 202.
2787. Paspalum setaceum Mx. 3442. See P. rigidifolium, p. 205.
2788. Paspalum caespitosum Flügge 3443, 3444. See p. 201.
2789. Paspalum leucocheilum sp. nov. See P. virgatum, p. 206.
2790. Paspalum papillosum Spr.? 3844, p. p. See p. 204.
2791. Paspalum clavuliferum sp. nov. 3444 p. p. See p. 201.
2792. Paspalum decumbens Sw. 3851. See P. pedunculatum, p. 205.
2793. Paspalum virgatum L. 3446. See p. 206. 3840. See P. millegrana, p. 203.
2794. Paspalum plicatulum Mx. 768, 3839. See p. 205. 3843. See P. elatum, p. 202.
2794. Paspalum densum Poir. 3447. See p. 202.
2795. Paspalum paniculatum L. 766. See p. 204.
2796. Paspalum rottboellioides sp. nov. 3864. See p. 205.
2797. Paspalum hemicryptum sp. nov. 3847. See p. 203.
2798. Paspalum caudicatum sp. nov. 3866. See P. nanum, p. 204.
2799. Paspalum swartzianum Flügge? 3848. See Paspalum sp., p. 206.
2800. Paspalum compressum Nees. 3849. See Axonopus compressus, p. 207.
2801. Panicum filiforme L. 1544. See Syntherisma filiformis, p. 209, and S. leucocoma, p. 209.
2802. Panicum horizontale Meyer. 764. See Syntherisma digitata, p. 209, and S. sanguinalis, p. 209. 3883. See Syntherisma sanguinalis, p. 209.
2803. Panicum sclerochloa Trin? 3859. See Mesosetum wrightii, p. 211.
2804. Panicum rottboellioides Kth. 3449. See Mesosetum rottboellioides, p. 211.

2805. Panicum platyphyllum Munro. 3441, 3867. See Brachiaria plantaginea, p. 212.
2806. Panicum paspaloides Pers. 761. See Panicum geminatum, p. 222.
2807. Panicum colonum L. 752. See Echinochloa colona, p. 213.
2808. Panicum crus-galli L. 3879. See Echinochloa walteri, p. 213.
2809. Panicum prostratum Lam. 762, 3857. See P. reptans, p. 225.
2810. Panicum grossarium L. 3869. See P. adspersum, p. 217.
2811. Panicum laxum Sw. 759, 3862. See p. 223.
2812. Panicum mayarense sp. nov. 3468 p. p. See Ichnanthus mayarensis, p. 228.
2813. Panicum amphistemon sp. nov. 3464. See Alloteropsis amphistemon, p. 211.
2814. Panicum distantiflorum Rich. 3452. See p. 220.
2815. Panicum diffusum Sw. 1540, 3877. See p. 220.
2816. Panicum fuscum Sw. 754. See P. fasciculatum, p. 221.
2817. Panicum molle Sw. 1545. See P. numidianum, p. 224.
2818. Panicum oryzoides Sw. 3466. See P. zizanioides, p. 228.
2819. Panicum stenodes Gris. 3860. See P. chloroticum, p. 218. 3870. See P. tenerum, p. 227. 3871. See p. 227.
2820. Panicum proliferum Lam. 3456, 3861. See P. chloroticum, p. 218.
2821. Panicum durum Gris. 1539, 3868. See Alloteropsis dura, p. 211.
2822. Panicum distichum Lam. 3451. See P. pilosum, p. 225.
2823. Panicum agrostoides Muhl. 3862. See P. condensum, p. 219.
2824. Panicum maximum Jacq. See p. 224.
2825. Panicum virgatum L. 3873. See P. virgatum cubense, p. 227.
2826. Panicum altissimum Mey. 3872. See P. megiston, p. 224.
2827. Panicum rudgei R. S.? 758. See P. hirtivaginum, p. 223.
2828. Panicum divaricatum L. 747, 748. See p. 220. 3465. See P. rugelii, p. 226.
2829. Panicum sloanei Gris. 3878. See p. 226.
2830. Panicum martinicense Gris. 749. See P. compactum, p. 219. 3457. See P. grisebachii, p. 222.
2831. Panicum lasianthum Trin. 3455, 3855. See P. sellovii, p. 226.
2832. Panicum glutinosum Sw. 757. See p. 222.
2833. Panicum cayennense Lam? (Sine numero). See p. 218.
2834. Panicum dichotomum L. 3460. See P. lancearium, p. 223. 3461. See P. chrysopsidifolium, p. 218, P. fusiforme, p. 222, P. lancearium, p. 223, and P. pauciciliatum, p. 225. 3462. See P. erectifolium, p. 221. 3463. See P. leucothrix, p. 224, P. caerulescens, p. 219, P. tenue, p. 227, and P. wrightianum, p. 228. 3874. See P. acuminatum, p. 217. 3875. See P. polycaulon, p. 225. P. strigosum, p. 227. 3876. See P. pauciciliatum, p. 225. 3453. See P. fusiforme, p. 222, P. chrysopsidifolium, p. 218, and P. neuranthum, p. 224. 3454. See P. chrysopsidifolium, p. 218, and P. fusiforme, p. 222.
2835. Panicum brevifolium L. 1538. See P. trichoides, p. 227.
2836. Panicum cyanescens L. 3458. See P. parvifolium, p. 225. 3459. See P. nitidum, p. 224.
2837. Panicum microcarpum Muhl. 753. See P. trichanthum, p. 227.
2838. Panicum viscidum Ell. 3467. See P. scoparium, p. 226.
2839. Panicum pallens Sw. 750. See Ichnanthus pallens, p. 228. 3882. See Ichnanthus nemorosus, p. 228.
2840. Panicum nemorosum Sw. 3858, 3881. See Ichnanthus nemorosus, p. 228.
2841. Panicum stoloniferum Poir? 3880. See Ichnanthus wrightii, p. 229.
2842. Panicum amplexicaule Rudge. 3863. See Hymenachne auriculata, p. 212.
2843. Panicum gibbum Ell. 3885. See Sacciolepis striata, p. 213.
2844. Panicum vilvoides Trin. 3470. See Sacciolepis vilvoides, p. 213.
2845. Hymenachne myurus Beauv. 3469. See H. amplexicaulis, p. 212.
2846. Eriochloa punctata Hamilt. 1542. See p. 208.
2847. Eriochloa annulata Kth? 3886. See Eriochloa ramosa, p. 208.

2848. Chamaerhaphis parvigluma Munro. 3909. See Paratheria prostrata, p. 232.
2849. "Orthopogon hirtellus R. Br." See Oplismenus hirtellus, p. 229.
2850. Orthopogon setarius Spreng. 1593. See Oplismenus hirtellus, p. 229.
2851. Orthopogon loliaceus Spreng. 751. See Oplismenus hirtellus, p. 229.
2852. Setaria glauca Beauv. 3888. See Chaetochloa imberbis penicillata, p. 230.
2853. Setaria setosa Beauv. 3474, 3487. See Chaetochloa onurus, p. 230.
2854. Pennisetum setosum Rich. 3471. See p. 232.
2855. Gymnothrix domingensis Spreng. 1547. See Pennisetum domingense, p. 232.
2856. Stenotaphrum americanum Schrank. 3490. See S. secundum, p. 232.
2857. Isachne leersioides Gris. 1547. See p. 208.
2858. Cenchrus viridis Spreng. 3889. See p. 231.
2859. Cenchrus tribuloides L. 3476. See Cenchrus carolinianus, p. 231 and C. viridis, p. 231.
2860. Cenchrus distichophyllus Gris. 3475. See p. 231.
2861. Anthephora elegans Schreb. 3870. See A. hermaphrodita, p. 196.
2862. Lappago racemosa Willd. 3489. See Nazia aliena, p. 196.
2863. Triscenia ovina Gris. 756. See p. 198.
2864. Arundinella brasiliensis Radd. 1552. See A. peruviana, p. 197.
2865. Arundinella phragmatoides Gris. 3479. See A. deppeana, p. 196.
2866. Arundinella martinicensis Gris. 3478. See p. 197.
2867. Tricholena insularis Gris. 1541. See Valota insularis, p. 210.
2868. Rottboellia impressa Gris. 3904. See Manisuris impressa, p. 191.
2869. Rottboellia filifolia. Sp. nov. 3905. See Manisuris loricata, p. 191.
2870. Manisuris granularis Sw. 1553. See Hackelochloa granularis, p. 191.
2871. Andropogon contortus L. 1559. See Heteropogon contortus, p. 196.
2872. Andropogon saccharoides Sw. 1556. See A. leucopogon, p. 193.
2873. Andropogon alopecuroides L. 3903. See Erianthus saccharoides, p. 190.
2874. Andropogon halepensis Sibth. 3488. See Holcus halepensis, p. 195.
2875. Andropogon nutans L. 3896. See Sorghastrum francavillanum, p. 195. 3897. See Sorghastrum setosum, p. 195.
2876. Andropogon leucostachyus Kth. 3900. See p. 193.
2877. Andropogon virginicus L. 3901. See p. 194.
2878. Andropogon spathiflorum Kth. 3481. 3480. See p. 194.
2879. Andropogon macrouros Mx. 1555. See A. glomeratus, p. 193.
2880. Andropogon bicornis L. 770. See p. 192.
2881. Andropogon tener Kth. 1558? See p. 194, and A. brevifolius, p. 192. 3482. See p. 194.
2882. Andropogon brevifolius Sw. 1558. See p. 192.
2883. Andropogon gracilis Spreng. 3480. See p. 193.
2884. Andropogon sp. 3898. See A. cubensis, p. 192.
2885. Andropogon wrightii Munro, 293, 263, 3895. See Rhaphis pauciflora, p. 195.
2886. Andropogon fastigiatus Sw. 3483. See p. 193.
2887. Andropogon sp. 3889. See Cenchrus viridis, p. 231.
2888. Andropogon sp. 3892, 3893. See Trachypogon filifolius, p. 191.
2889. Andropogon sp. 3891. See A. semiberbis, p. 194.
2890. Imperata caudata Trin. 3486. See I. brasiliensis, p. 190.
2891. Perotis? cubana spec. nov. 735. See Chaetium cubanum, p. 232.

GRASSES COLLECTED IN CUBA BY WRIGHT, ARRANGED BY NUMBERS.

731. Homalocenchrus monandrus.
732. Lithachne pauciflora.
733. Pharus glaber.
734. Bouteloua americana.
735. Chaetium cubanum.
736. Aristida curtifolia.
737. Aristida mohrii.
738. Arthrostylidium capillifolium.
739. Bouteloua americana.
740. Leptochloa mucronata.[a]
Leptochloa virgata.
741. Leptochloa mucronata.
Leptochloa virgata.
742. Aristida mohrii.
Chloris radiata.
743. Chloris ciliata.
744. Eleusine indica.
745. Eragrostis tephrosanthes.
746. Olrya latifolia.
747. Panicum divaricatum.
748. Panicum divaricatum.
749. Panicum compactum.
750. Ichnanthus pallens.
751. Oplismenus hirtellus.
752. Echinochloa colona.
753. Panicum tricanthum.
754. Panicum fasciculatum.
755. Panicum exiguiflorum.
Isachne leersioides.
756. Triscenia ovina.
Panicum exiguiflorum.
757. Panicum glutinosum.
758. Panicum hirtivaginum.
759. Panicum laxum.
760. Ichnanthus wrightii.
761. Panicum geminatum.
762. Panicum reptans.
763. Panicum reptans.
Axonopus compressus.
764. Syntherisma digitata.
Syntherisma sanguinalis.
765. Axonopus compressus.
766. Paspalum paniculatum.
767. Paspalum conjugatum.
768. Paspalum plicatulum.
769. Paspalum filiforme.
770. Andropogon bicornis.
1536. Lithachne pineti.
1537. Sporobolus indicus.
1538. Panicum trichoides.
1539. Alloteropsis dura.
1540. Panicum diffusum.
1541. Valota insularis.
1542. Eriochloa punctata.
1543. Oplismenus hirtellus.
1544. Syntherisma filiformis.
Syntherisma leucocoma.
1545. Panicum numidianum.
1546. Paspalum distichum.
Paspalum vaginatum.
1547. Isachne leersioides.
Pennisetum domingense.
1548. Chloris cruciata.
Chloris eleusinoides.
1549. Chloris cruciata.
Chloris eleusinoides.
1550. Eragrostis ciliata.
1551. Leptochloa spicata.
1552. Arundinella peruviana.
1553. Hackelochloa granularis.
1554. Arthrostylidium fimbriatum.
1555. Andropogon bicornis.
Andropogon glomeratus.
1556. Andropogon leucopogon.
1557. Andropogon gracilis.
1558. Andropogon brevifolius.
Andropogon tener.
1559. Alloteropsis dura.
Heteropogon contortus.
1560. Gynerium sagittatum.
1593. Oplismenus hirtellus.
1848. Chloris cruciata.
2823. Uniola paniculata.
2829. Sporobolus indicus.
2830. Sporobolus virginicus.
3422. Eragrostis glutinosa.
Sporobolus cubensis.
3423. Eragrostis elliottii.
3424. Eragrostis cubensis.
3425. Eragrostis excelsa.
3426. Sporobolus indicus.
3427. Sporobolus cubensis
Sporobolus purpurascens.
3428. Reynaudia filiformis.
3429. Leptocoryphium lanatum.
3430. Aristida refracta.
3431. Aristida refracta.
3432. Aristida erecta.
3433. Aristida mohrii.
3434. Homalocenchrus hexandrus.

[a] Two or more species when here listed under one number were all distributed under this number by Wright.

3435. Mniochloa strephioides.
3436. Leptochloa virgata.
3437. Reimarochloa brasiliensis.
3438. Paspalum notatum.
Paspalum minus.
3439. Paspalum pulchellum.
3440. Paspalum dissectum.
3441. Brachiaria plantaginea.
3442. Paspalum rigidifolium.
3443. Paspalum arenarium.
Paspalum caespitosum.
3444. Paspalum caespitosum.
Paspalum clavuliferum.
Paspalum papillosum.
Paspalum rupestre.
3445. Paspalum rupestre.
3446. Paspalum virgatum.
Paspalum virgatum schreberianum.
3447. Paspalum densum.
3448. Mniochloa pulchella.
3449. Mesosetum rottboellioides.
3450. Panicum exiguiflorum.
3451. Panicum pilosum.
3452. Panicum distantiflorum.
3453. Panicum chrysopsidifolium.
Panicum fusiforme.
Panicum neuranthum.
3454. Panicum chrysopsidifolium.
Panicum fusiforme.
3455. Panicum sellovii.
3456. Panicum chloroticum.
3457. Panicum grisebachii.
Panicum pilosum.
3458. Panicum parvifolium.
3459. Panicum nitidum.
3460. Panicum lancearium.
3461. Panicum chrysopsidifolium.
Panicum fusiforme.
Panicum lancearium.
Panicum pauciciliatum.
3462. Paspalum densum.
Panicum erectifolium.
Panicum sellovii.
3463. Panicum caerulescens.
Panicum leucothrix.
Panicum tenue.
Panicum wrightianum.
3464. Alloteropsis amphistemon.
3465. Panicum rugelii.
3466. Panicum zizanioides.
3467. Panicum scoparium.
3468. Ichnanthus mayarensis.
3469. Hymenachne amplexicaulis.
3470. Sacciolepis vilvoides.
3471. Pennisetum setosum.
3472. Chaetochloa imberbis.
3473. Chaetochloa imberbis.
3474. Chaetochloa onurus.
3475. Cenchrus distichophyllus.
Pennisetum setosum.
3476. Cenchrus viridis.
Cenchrus carolinianus.
3477. Gynerium sagittatum.
3478. Arundinella martinicensis.
3479. Arundinella deppeana.
3480. Andropogon gracilis.
Andropogon spathiflorus.
3481. Andropogon spathiflorus.
3482. Andropogon tener.
3483. Andropogon fastigiatus.
3484. Andropogon gracilis.
3485. Andropogon fastigiatus.
3486. Imperata brasiliensis.
3487. Chaetochloa onurus.
Achlaena piptostachya.
3488. Holcus halepensis.
3489. Nazia aliena.
3490. Stenotaphrum secundum.
3719. Chloris petraea.
3808. Arthrostylidium distichum.
3809. Arthrostylidium cubense.
3810. Arthrostylidium urbanii.
3811. Arthrostylidium cubense.
3812. Leptochloa fascicularis.
3813. Luziola bahiensis.
3814. Capriola dactylon.
3815. Bouteloua americana.
3816. Bouteloua americana.
3817. Chloris petraea.
3818. Chloris eleusinoides.
3819. Chloris eleusinoides.
3821. Dactyloctenium aegyptium.
3822. Leptochloa fascicularis.
3823. Uniola paniculata.
3825. Eragrostis cubensis.
3826. Eragrostis hypnoides.
3827. Eragrostis airoides.
3828. Sporobolus argutus.
3829. Sporobolus indicus.
3830. Sporobolus virginicus.
3831. Aristida refracta.
Dactyloctenium aegyptium.
3832. Aristida refracta.
3833. Aristida refracta.
3834. Aristida refracta.
3835. Aristida scabra.
3836. Muhlenbergia capillaris.
3837. Homalocenchrus hexandrus.

3838. Oryza sativa.
3839. Paspalum plicatulum.
Paspalum pulchellum.
3840. Paspalum millegrana.
3841. Paspalum alterniflorum.
3842. Paspalum nanum.
3843. Paspalum elatum.
3844. Paspalum papillosum.
3845. Paspalum propinquum.
3846. Paspalum glabrum.
3847. Paspalum hemicryptum.
3848. Paspalum sp.
3849. Axonopus compressus.
3850. Axonopus compressus.
3851. Paspalum pedunculatum.
3852. Panicum diffusum.
3853. Brachiaria plantaginea.
3854. Paspalum vaginatum.
Reimarochloa oligostachya.
3855. Panicum sellovii.
3856. Panicum laxum.
3857. Panicum reptans.
3858. Ichnanthus nemorosus.
3859. Mesosetum wrightii.
3860. Panicum chloroticum.
Panicum diffusum.
Panicum hirtivaginum.
Panicum tenerum.
3861. Panicum chloroticum.
3862. Panicum condensum.
Panicum laxum.
3863. Hymenachne auriculata.
Panicum condensum.
Panicum laxum.
3864. Paspalum rottboellioides.
3865. Panicum cayennense.
3866. Paspalum nanum.
3867. Brachiaria plantaginea.
3868. Alloteropsis dura.
3869. Panicum adspersum.
3870. Anthephora hermaphrodita.
3870. Panicum distantiflorum.
Panicum tenerum.
3871. Panicum stenodes.
3872. Panicum megiston.
3873. Panicum virgatum cubense.
3874. Panicum acuminatum.
3875. Panicum polycaulon.
Panicum strigosum.
3876. Panicum pauciciliatum.
3877. Panicum diffusum.
Panicum exiguiflorum.
3878. Panicum sloanei.
3879. Echinochloa walteri.
3880. Ichnanthus wrightii.
3881. Ichnanthus nemorosus.
3882. Ichnanthus nemorosus.
3883. Syntherisma sanguinalis
3884. Syntherisma villosa.
3885. Sacciolepis striata.
3886. Eriochloa ramosa.
3887. Chaetochloa onurus.
3888. Chaetochloa imberbis penicillata.
3889. Cenchrus viridis.
3890. Anthephora hermaphrodita.
3891. Andropogon semiberbis.
3892. Trachypogon filifolius.
3893. Trachypogon filifolius.
3894. Unidentified.
3895. Rhaphis pauciflora.
3896. Sorghastrum francavillanum.
3897. Sorghastrum setosum.
3898. Andropogon cubensis.
3899. Andropogon nashianus.
3900. Andropogon leucostachys.
3901. Andropogon virginicus.
3902. Andropogon bicornis.
3903. Erianthus saccharoides.
3904. Manisuris impressa.
3905. Manisuris loricata.
3906. Paratheria prostrata.
3909. Paratheria prostrata.

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UNITED STATES NATIONAL MUSEUM

CONTRIBUTIONS

FROM THE

UNITED STATES NATIONAL HERBARIUM

VOLUME XII, PART 7

STUDIES OF MEXICAN AND CENTRAL AMERICAN PLANTS—No. 6

By J. N. ROSE

WASHINGTON
GOVERNMENT PRINTING OFFICE
1909

BULLETIN OF THE UNITED STATES NATIONAL MUSEUM.

ISSUED APRIL 12, 1909.

PREFACE.

The accompanying report by Dr. J. N. Rose is a continuation of his Studies of Mexican and Central American Plants. It varies little in style and treatment from the earlier numbers, of which five have already been published. They all emphasize the botanical richness of the countries south of the United States, and the importance of careful work by experienced collectors.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

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STUDIES OF MEXICAN AND CENTRAL AMERICAN PLANTS—NO. 6.[a]

By J. N. Rose.

INTRODUCTORY NOTES.

This paper consists largely of descriptions of new species found in the process of naming large collections from Mexico, or in revising various genera of Mexican plants. It forms the sixth of this series and differs little in its scope from previous ones. The collections studied have been chiefly those mentioned in my last paper, together with material received during the year 1906. A somewhat detailed account of my sixth journey through Mexico will not be out of place here.

On July 26 I was authorized by Dr. R. Rathbun, Assistant Secretary in charge of the National Museum, to proceed to Mexico for the purpose of continuing my botanical explorations there. By the kindness of Dr. N. L. Britton, Director of the New York Botanical Garden, who placed a generous sum from the Garden funds at my disposal, I was enabled to take an assistant with me from Washington. I left Washington August 1 accompanied by my son, Joseph S. Rose, for the city of Mexico. En route for that city I made short stops at San Antonio and Laredo, Texas, where small collections were obtained. The City of Mexico was reached August 10, and for several days thereafter I was engaged in establishing suitable headquarters in that city. Some time was also spent at the herbarium of the Instituto Medico Nacional, where every facility was given to help me in my work. A short trip was also made during this time to the pedregal near Tlalpam, where a number of cacti and ferns were obtained. In the city of Mexico I was joined by Dr. C. G. Pringle and his assistant, Filemón Lozano, who accompanied me on various side trips. From the City of Mexico short trips were made to Cuernavaca, El Parque, Querétaro, Pachuca, and various places in the valley of Mexico, including one for water lilies to Lake Xochimilco. Toward the end of August I was joined in the city of Mexico by Dr. D. T. MacDougal and soon afterwards we changed our base to Tehuacán, Puebla. Here we explored the limestone hills on both sides of the town, making large collections

[a] Continued from Vol. X, p. 132, of the Contributions.

of herbarium specimens and selecting exhibition specimens of cacti, which were shipped to the New York Botanical Garden. From Tehuacán side trips were made along the tramway toward Esperanza and to Oaxaca city, and from the latter point Mitla was visited, where two days were spent in and about Tomellín Cañon. A short trip was made to Vera Cruz and also to Leon, after which I closed up my field work and returned to Washington.

The herbarium material collected contains more than 500 numbers (11001–11534), a full set of which has been mounted for the National Herbarium.

In addition to the herbarium material 236 specimens of seeds, bulbs, and succulents (chiefly cacti) were collected and sent to Washington. At the same time a nearly full set of the cacti was selected and shipped to the New York Botanical Garden. Many of these latter specimens were of immense size and form striking exhibition objects.

The following table will show in detail the places visited, the date of each visit, and the number of miles traveled in course of this trip:

ITINERARY.

1906.		Miles.
Aug.	10. City of Mexico to Tlalpam, Distrito Federal and return	15
	13. City of Mexico to Cuernavaca, by rail	74
	14. Cuernavaca to pedregal and return	16
	15. Cuernavaca to City of Mexico and return, by rail	74
	17. City of Mexico to El Parque and return, by rail	114
	20. City of Mexico to Querétaro, by rail	153
	24. Querétaro to City of Mexico, by rail	153
	31. City of Mexico to Tehuacán, by rail	208
Sept.	1. El Riego to hills east of Tehuacán and return	10
	3. Tehuacán to Oaxaca City, by rail	148
	5, 6. Oaxaca city to Mitla and return, by stage	70
	7. Oaxaca city to Santa Catalina, by train	45
	7. Santa Catalina to Tomellín station	22
	8. Tomellín to Tehuacán, by rail	81
	14. Tehuacan toward Esperanza and return, by tramway	30
	17. Tehuacan to Esperanza, by tramway	31
	17. Esperanza to Orizaba, by rail	30
	18. Orizaba to Vera Cruz, by rail	30
	20. Vera Cruz to City of Mexico, by rail	51
	23. City of Mexico to Pachuca, Hidalgo, by rail	61
	24. Pachuca to Sierra de Pachuca and return	10
	24. Pachuca to City of Mexico	61
	26. City of Mexico to Xochimilco and return	15
	28. City of Mexico to Leon Guanajuato, by rail	259
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CYCADACEAE

A NEW SPECIES OF DIOON.

Dioon purpusii Rose, sp. nov.

Trunk short, crowned by numerous leaves, these often a meter or more long, stiff and ascending; petioles somewhat 4-angled; pinnæ 5 to 9 cm. long, stiff, pungent, towards the base, 1 to 1.5 cm. apart, above closely set, entire on the lower margin,

BEAUCARNEA GOLDMANII ROSE.

but usually with 1, 2, or rarely 3 sharp spine-like teeth on the upper margin; male cones 15 to 20 cm. long, the bracts with recurved ovate tips; female cones ovate, 44 cm. long by 20 cm. broad near the base; bracts very woolly, 10 to 15 cm. long; seeds about 4 cm. in diameter.

Collected by D. T. MacDougal and J. N. Rose, September 7, 1906, in Tomellín Cañon, Oaxaca (*Rose* 11352, type), and by C. A. Purpus in Sierra Mixteca, Puebla, in 1908.

Type U. S. National Herbarium no. 454142.

The specimens found by MacDougal and Rose were in a deep canyon well shaded by bushes and small trees. Both male and female cones were taken and also a living plant. The latter is now growing in the conservatory of the New York Botanical Garden, where also are preserved the cones. In 1908 Dr. Purpus collected seeds and bracts.

GNETACEAE.

A NEW SPECIES OF EPHEDRA.

I was much surprised to find an Ephedra on the desert plain about Tehuacán, as none had been reported farther south than San Luis Potosí. This one is so clearly distinct from those of northern Mexico that I do not hesitate to describe it as new.

Ephedra compacta Rose, sp. nov.

A low very compact shrub, 30 to 50 cm. high with many numerous short spinescent branches, at first light green but becoming very pale; leaves opposite, high-connate; male flowers not seen; fruit scales in pairs, high-connate, when mature forming a small red fleshy fruit; seeds 2.

Collected by J. N. Rose and J. S. Rose near Tehuacán, September, 1906 (no. 11274, type), and at same station by Rose and Painter, August and September, 1905 (no. 10023).

Type U. S. National Herbarium no. 454055.

Nearest *E. pedunculata* Engelm., but lower, of much more compact habit, and with paler and less fluted stems.

LILIACEAE.

A NEW SPECIES OF BEAUCARNEA.

Since publishing my enumeration of the species of Beaucarnea in volume 10, page 87, of this publication, an additional species has been sent me by Mr. E A. Goldman, of the Biological Survey, Department of Agriculture, which is here described:

Beaucarnea goldmanii Rose, sp. nov. PLATE XX.

Tall slender tree with swollen base; leaves hanging, 80 to 90 cm. long, 3 cm. broad at the base, 1 to 1.5 cm. broad a short distance above the base, tapering toward the apex into a long acumination 20 to 30 cm. long, smooth on both surfaces, the margin nearly or quite smooth; inflorescence a panicle 30 to 50 cm. long; pedicels 8 to 10 mm. long, jointed near the middle; fruit somewhat glaucous, 18 to 20 mm. long, broadly 3-winged, notched at base and apex.

Collected by E. A. Goldman at San Vicente, Chiapas, April 26, 1904 (no. 887).

Type U. S. National Herbarium no. 566461.

This species resembles somewhat *B. guatemalensis*, but has the leaves larger and the fruit narrower, glaucous, and less notched at apex.

EXPLANATION OF PLATE XX.—Two views of the type tree reproduced from photographs taken by Mr. E. A. Goldman. These are here used through the courtesy of the Biological Survey of the Department of Agriculture.

A NEW SPECIES OF BESCHORNERIA.[a]

Very little is known about the species of Beschorneria in Mexico itself, although I believe the genus is endemic to that country. All the species have been described from greenhouse material. In 1906 Dr. Pringle rediscovered *B. yuccoides* in the mountains above Pachuca and later in the season he took me to the locality, where I collected material both for the herbarium and for the greenhouse. While studying this material I reached the conclusion that certain material from San Luis Potosí, heretofore referred to *B. tubiflora*, represents a new species, and this is here described:

Beschorneria rigida Rose, sp. nov.

Leaves numerous, erect, rather rigid, 30 cm. long, 2 cm. or less broad, narrowing into a long acumination, roughened on both surfaces; inflorescence about a meter long; bracts 15 to 20 cm. long, large, purplish, each subtending 2 to 4 flowers; whole flower 4.5 cm. long; perianth segments dull in color, usually greenish yellow, somewhat scabrous; stamens shorter than the segments; capsule oblong in outline, 3 cm. long; seeds black.

The following specimens have been examined:

San Luis Potosí: Near Alvarez, Palmer & Parry, 1878 (no. 866); same station, Dr. E. Palmer, May, 1905 (no. 593, type).

Guanajuato: Near San Felipe, Dr. G Baroetta, 1904 (Economic herbarium U. S. Department of Agriculture).

The type is U. S. National Herbarium no. 570098.

This has heretofore been taken for *B. tubiflora*, but a careful reading of the original description of *Furcraea tubiflora* clearly excludes it. The leaves are narrower, erect, rough on both surfaces, the flowers more numerous and duller in color.

Dr. G. Barroetta, of San Luis Potosí, reports that this species is a fiber plant.

RAFFLESIACEAE.

THE NORTH AMERICAN SPECIES OF PILOSTYLES.

The first species of Pilostyles found in North America was collected by Dr. Geo. Thurber in 1850 in southwestern Arizona. Between that time and 1890 no additional species were found, but since the latter date much material, embracing several new species, has been received at the National Herbarium, especially from Mexico. Prof. Solms-Laubach, who monographed the genus in 1901, recognized but two species in North America.

The material now on hand contains 8 species, four of which are here first described. All our American species are found on three genera of Leguminosae.

---

[a] A. Berger has recently published another new species: *Beschorneria pubescens* Berger, Monatsschr. Kakteenk. **17**: 1. 1907.

A list of these hosts and the localities from which they came is as follows:

HOSTS OF SPECIES OF PILOSTYLES.

Host.	Parasite.	Locality.
Parosela canescens Rose.	Pilostyles glomerata.	Tehuacán, Puebla.
Parosela emoryi (A. Gray) Heller.	Pilostyles thurberi.	Southwestern Arizona.
Parosela formosa (Torr.) Vail.	Pilostyles covillei.	Texas.
Parosela hospes Rose.	Pilostyles pringlei.	Near Monterey, Nuevo Leon.
Parosela leucostoma Rose.	Pilostyles palmeri.	San Luis Potosí.
Parosela microphylla Rose.	Pilostyles sp.	Sierra del Mesa, Hidalgo.
Parosela tuberculata Rose.	Pilostyles sessilis.	Hidalgo and Querétaro.
Bauhinia lunarioides A. Gray.	Pilostyles globosa.	Near Monterey, Nuevo Leon.
Calliandra grandiflora Benth.	Pilostyles mexicana.	Zacualpan, Vera Cruz.

The following are the North American species:

Pilostyles covillei Rose, sp. nov. FIGURE 20.

Similar to *P. glomerata*, but the flowers smaller (2 mm. long), style wanting, stamens in three rows; ovary slightly 4-lobed within; ovules covering the whole wall.

The host is *Parosela formosa* (Torr.) Vail.

Collected by Frederick V. Coville at Matador ranch, Dickens County, Texas, June 14, 1894 (no. 1860, type), between Big Springs and Dorwood ranch, Texas, June 19, 1904 (no. 1891).

Type U. S. National Herbarium no. 500506.

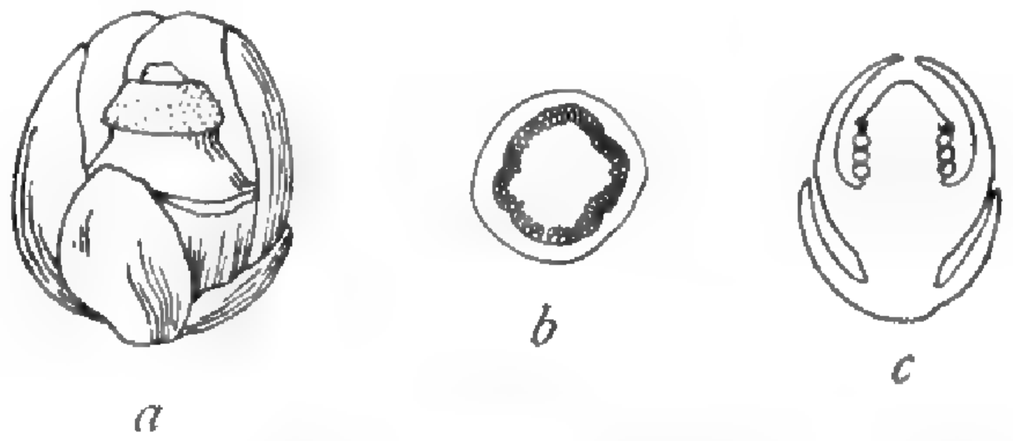

FIG. 20.—Flowers of *Pilostyles covillei*. *a*, Female flower, the ovary exposed; *b*, cross section of ovary; *c*, longitudinal section of male flower. Scale 6.

Pilostyles globosa (S. Wats.) Solms-Laub. in Engler, Pflanzenreich IV. **75**: 14. 1901.

Apodanthes globosa S. Wats. in Robins. Bot. Gaz. **16**: 84. 1901.

Host *Bauhinia lunarioides* A. Gr.

Pilostyles glomerata Rose, sp. nov. FIGURE 21.

Flowers 3 mm. long and nearly as broad at base; female flowers usually on separate host plants; bracts and sepals 4 each, dark brown with lighter margins, more or less unequal, orbicular to shortly oblong, rounded at apex; petals 4, purple, rounded at apex; style short but distinct, stigma cap large, bearing a small cone at apex; ovary one-celled, 4-lobed within, the inner surface covered with ovules; male flowers with similar bracts and perianth parts; stamen column short but distinct, with a broad rounded cap, anthers wanting (apparently few, as the band upon which they stand is very narrow).

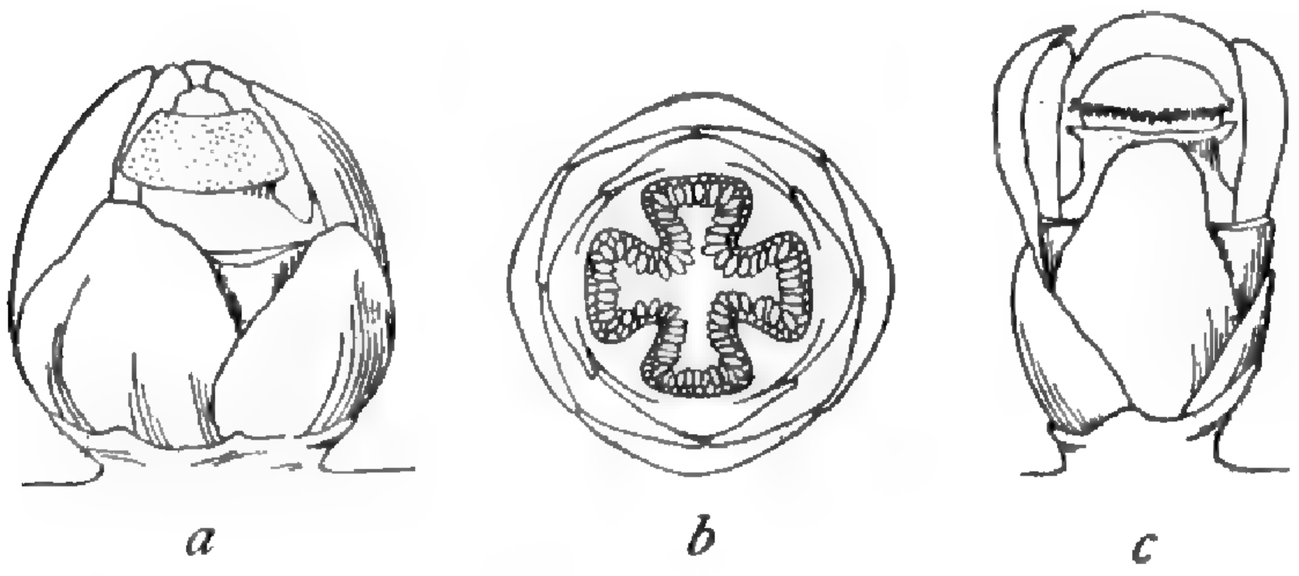

FIG. 21.—Flowers of *Pilostyles glomerata*. *a*, Female flower, the ovary exposed; *b*, cross section of same; *c*, male flower. Scale 6.

The host is a Parosela, perhaps *P. canescens* Rose.

Collected by Rose and Painter in two localities near Tehuacán, Puebla, September 1905 (no. 8942). This species was very common, but collectors might easily overlook it.

Type U. S. National Herbarium no. 453435.

The flowers occur in great masses on the lower parts of the stem and branches of the host, often retarding its growth and doubtless eventually causing its death.

Pilostyles mexicana (Brandeg.) Rose.

Apodanthes mexicana Brandeg. Zoe **5**: 244. 1908.

Host *Calliandra grandiflora* Benth.

Pilostyles palmeri Rose, sp. nov. FIGURE 22.

Somewhat similar to *P. glomerata*, but flowers smaller (2 mm. long), the bracts and sepals deep purple, the petals nearly white or tinged with pink, the style sessile, the ovary with the 4 placentas hardly indented, and the ovules borne in definite lines.

Only the female flowers are known.

The host plant is also a Parosela, probably *P. leucostoma* Rose.

Collected by Dr. E. Palmer near Alvarez, San Luis Potosí, May, 1905 (no. 584).

Type U. S. National Herbarium no. 570088.

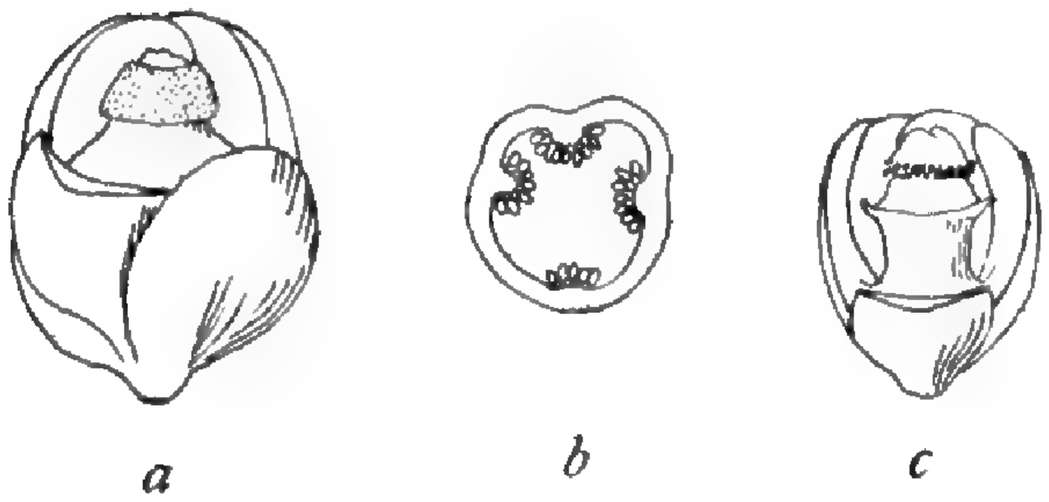

FIG. 22.—Flowers of *Pilostyles palmeri*. *a*, Female flower, the ovary exposed; *b*, cross section of ovary; *c*, male flower, interior exposed. Scale 6.

Pilostyles pringlei (S. Wats.) Rose.

Apodanthes pringlei S. Wats. in Robins. Bot. Gaz. **16**: 83. 1891.

Host *Parosela hospes* Rose.

Pilostyles sessilis Rose sp. nov. FIGURE 23.

Similar to *P. glomerata*, but bract and sepals deep purple, stigma sessile, inside walls of the capsule irregularly rugose, covered with seeds throughout.

The male flowers also have a sessile column and the stamens form a broad band of 4 rows.

The male flowers are described from specimens collected by Mr. Rose near Ixmiquilpan, Hidalgo, in 1905 (no. 9041). Only a single plant infested by this parasite was here found, although diligent search was made for others. The female flowers

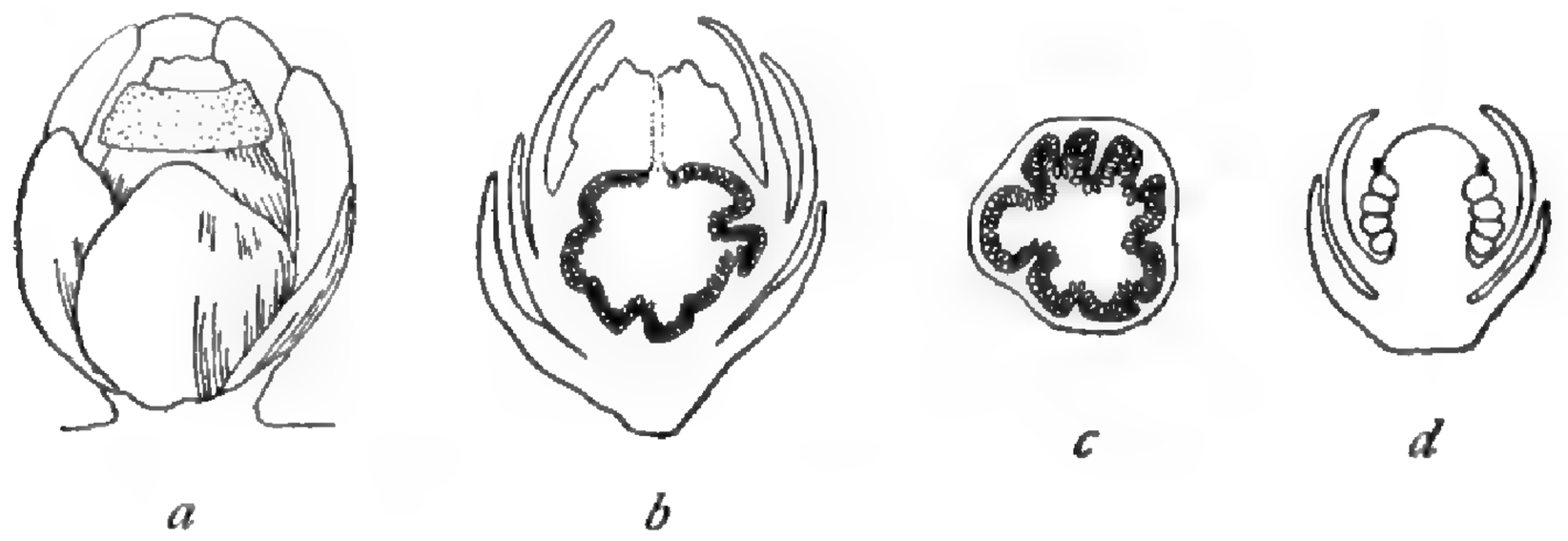

FIG. 23.—Flowers of *Pilostyles sessilis*. *a*, Female flower, the ovary exposed; *b*, longitudinal section of same; *c*, transverse section of ovary; *d*, longitudinal section of male flower. Scale 6.

are described from specimens collected by Rose and Painter on the Hacienda Ciervo, Querétaro, August 20, 1905 (no. 9636). Many specimens of the host were found infested, and a large series of herbarium specimens were collected.

The host in both the cases is a Parosela, probably *P. tuberculata* Rose.

Type U. S. National Herbarium no. 453127.

PILOSTYLES THURBERI A. GRAY.

Pilostyles thurberi A. Gray, Mem. Am. Acad. II. **5**: 326. 1854. PLATE XXI.
Host *Parosela emoryi* (A. Gray) Heller.

EXPLANATION OF PLATE XXI.—Plant of *Parosela schottii* bearing numerous individuals. Fig. 1, longitudinal section of branch showing mode of attachment of the parasite; 2, a fertile flower; 3, transverse section of flower; 4, longitudinal section of the same; 5, an ovule detached, highly magnified. Reproduction of plate 52, Torrey, Botany of the United States and Mexican Boundary Survey.

RANUNCULACEAE.

A NEW AQUILEGIA FROM THE HIGH MOUNTAINS.

Aquilegia madrensis Rose, sp. nov.

Stems 1 to 1.2 meters high, much branched above, pubescent becoming glabrate below; basal leaves long-petioled, triternate; leaflets usually on slender petioles, 2.5 cm. or less long, sometimes sessile, cuneate at base, irregularly cut or lobed, pale green above, much paler beneath, pubescent; flowers nodding; sepals broadly ovate, acuminate, 15 to 18 mm. long, puberulent; petals with a greenish rounded limb, the spur 4 cm. long, very much contracted below the middle, pale red in color; carpels 5, strongly nerved.

Collected by J. N. Rose and E. A. Goldman on the Sierra Madre west of Bolaños, September 15 to 17, 1897 (no. 2954).

Type U. S. National Herbarium no. 301908.

The species while near *Aquilegia skinneri* must be distinct, judging from the descriptions and colored figure of that species. The plant is taller and not glabrous like *A. skinneri*, the sepals broader, the leaf segments different, while the flowers are paler. *Aquilegia skinneri* is a Guatemala species and is perhaps restricted to that country. The Mexican specimens labeled *A. skinneri* which I have seen seem best referable to this species. These are Dr. E. Palmer's no. 336 from Chihuahua, collected in 1885, and Dr. Pringle's no. 1182 from the same State, collected in 1887.

CAPPARIDACEAE.

THE MEXICAN SPECIES OF WISLIZENIA.

Dr. E. L. Greene has published in the Proceedings of the Biological Society of Washington[a] a revision of the genus Wislizenia. Of the ten species enumerated by him five are attributed to Mexico, while two or three of the others may be looked for on the Mexican side of the border. Of the new species distributed three were collected by the writer in Mexico. Of my collections Dr. Greene has this to say in his preface:

"While pursuing this line of research, Mr. J. N. Rose pleasantly surprised me by bringing forth a series of species of his own gathering in Sonora and Lower California, upon which he had undertaken a critical study long since, which study had been interrupted, and these, together with the manuscript on them, he generously submitted to me, as an aid to this general revision. His own Sonoran species, both of them well marked in character, conclude the subjoined list of species, mostly new."

Wislizenia pacalis Greene, Proc. Biol. Soc. Wash. **19**: 131. 1906.

"Branches stout, often tortuous or flexuous, not quite glabrous, red-dotted, or purplish; leaflets always 3, oblong, usually very obtuse or even retuse or emarginate,

[a] Volume 19, pp. 127–132.

2 to 3 cm. long; racemes remarkably short, sessile; fruit short, only 3 to 4 mm. wide; carpels mostly round-obovate, in some specimens longer and subpyriform, the prominent striae 5 only, ending in a more or less distinct low tubercle, the intervening spaces conspicuously reticulate.

"La Paz, Lower California, 1890, Dr. Edw. Palmer, his no. 88 as in U. S. Herb. the type; but collected earlier—namely, in 1889—at San Juanico by Brandegee, and at the same place by Anthony in 1897. Also in 1897 it was collected at La Paz by Mr. Rose, no. 1311 as in U. S. Herb.; but these specimens have longer and even acutish leaflets; but the peculiarly reticulate carpels are about the same in all and are far more like those of the Texan and original *W. refracta* than like those of *W. palmeri;* and Mr. Rose found himself unable to refer them to either species; his label bearing, in his hand, nothing but the name of the genus."

Wislizenia fruticosa Greene, Proc. Biol. Soc. Wash. **19**: 131. 1906.

Only known from a single collection in Lower California.

Wislizenia palmeri Gray, Proc. Am. Acad. **8**: 622. 1873.

Only known from the region at the head of the Gulf of California.

Wislizenia costellata Rose; Greene, Proc. Biol. Soc. Wash. **19**: 132. 1906.

"Growing parts minutely and sparsely scaberulous; whole herbage more than usually glaucous, the branches very leafy, somewhat tortuous; leaves and their petioles of about equal length; leaflets cuneate-obovate, obtuse, only 1.5 to 2 cm. long; racemes subsessile, 1 to 1.5 dm. long; fruit only 3 mm. wide, the carpels at summit almost as thick as long, truncate at both ends, marked longitudinally by 5 or 6 ribs and many intervening closely compacted striæ, the main ribs gradually thicker toward the summit, where each ends in a stout low tubercle.

"Sonora, Mexico, between Nogales and Guaymas, June 4, 1897, J. N. Rose, no. 1294: type specimens in the U. S. National Herbarium. Easily distinct from *W. refracta* by the very short and thick strongly ribbed carpels, which are also truncate at the apex."

Wislizenia mamillata Rose; Greene, Proc. Biol. Soc. Wash. **19**: 132. 1906.

"Glabrous; leaves on slender petioles nearly as long as the leaflets, the latter also conspicuously petiolulate, the blade narrowly oblong, acutish, 2 to 3 cm. long; fruiting raceme stout and elongated, 10 to 20 cm. long, short-peduncled; fruit about 6.5 mm. wide, the carpels shuttlecock-shaped, coarsely and somewhat turgidly striate, not at all reticulate, somewhat constricted above the base, thence abruptly widening to a broad and strongly mamillate-tuberculate summit.

"Guaymas, Sonora, Mexico, June, 1887, Edw. Palmer, no. 74; also by J. N. Rose at the same place, June, 1897, Dr. Palmer's specimens having been distributed for *W. palmeri;* but in characters of fruit the plant is extremely different from *W. palmeri*, and even the foliage is all trifoliolate, while in *W. palmeri* all the leaves are simple, or unifoliolate."

CAESALPINIACEAE.

TWO NEW SPECIES OF CASSIA.

In the last number of these studies I published four species of Cassia. Since then two additional species have been discovered and these are here described.

Cassia articulata Rose, sp. nov.

A shrub, two meters high, the young parts densely stellate-pubescent; leaflets usually 4 pairs, ovate, 1.5 to 3.5 cm. long, acute or obtuse, densely stellate-pubescent

on both surfaces; rachis as well as pedicels and sepals also densely stellate-pubescent; gland between leaflets of lower pair narrow-elongated; pods 6 to 8 cm. long; many-jointed, strongly stipitate.

Collected by C. A. Purpus at San Pablo, near San José del Cabo, Lower California, in 1901 (no. 287, type) and by Nelson and Goldman between Miraflores and San Bernardino ranch, in Sierra La Laguna, Lower California, January, 1906 (no. 7418).

Type U. S. National Herbarium no. 470361.

This species is nearest *C. villosus*, but has small and differently shaped leaflets, a much narrower gland between the leaflets, fewer-flowered inflorescence, and perhaps a longer stipe to the pods.

Cassia macdougaliana Rose, sp. nov.

A low compact shrub, 30 to 60 cm. high; branches puberulent; stipules ovate, acute, dry, subpersistent; leaflets usually 3 or 4 pairs, short-oblong, 3 to 5 mm. long, mucronately tipped, glabrous above, puberulent beneath, thickish, the veins indistinct above, somewhat prominent beneath, rachis puberulent, bearing a stipitate cup-shaped gland; flowers borne toward the ends of the short branches, axillary, solitary; peduncle slender, puberulent; sepals membranaceous, obtuse; petals large, deep yellow, pods 3 cm. long, flat, nearly glabrous.

Collected by J. N. Rose in company with Dr. D. T. MacDougal near Tehuacán, Puebla, September 1, 1906 (no. 11253, type) and near the same locality by Rose and Hay in August, 1901 (no. 5888).

Type U. S. National Herbarium no. 454036.

This species is nearest *C. greggii*, from northern Mexico, but differs in its shorter, less glossy, and less reticulated leaflets.

Cassia greggii was referred by Bentham to his subgenus Chamaecrista, and it has since been transferred to the genus Chamaecrista, but its relationship is clearly not there.

A NEW SPECIES AND TWO CHANGES OF NAME IN CHAMAECRISTA.

A careful review of the various species of Chamaecrista in Mexico has brought to light one undescribed species and revealed the necessity of one change of name and one transfer from Cassia to Chamaecrista.

Chamaecrista amplistipulata Rose, sp. nov.

Suffrutescent and branching at base; stems somewhat zigzag, angled, glabrous, 20 to 30 cm. long; leaves closely set, 4 to 8 cm. long; stipules broadly ovate, tapering into a spinescent point, strongly nerved, long-ciliate; leaflets 30 to 40 or even more pairs, linear, 3 to 7 mm. long, acute, thickish, strongly 3-nerved below, either glabrous or ciliate; gland cup-shaped, sessile; flower buds acuminate; sepals thin, puberulent; petals 12 mm. long; ovary cinereous-pubescent; pod 3 to 4 cm. long, slightly hairy.

Collected by E. W. Nelson near Santa Efigenia, Oaxaca, July 18, 1894 (no. 2850).

Type U. S. National Herbarium no. 229222.

This species belongs in Bentham's series Coriaceae of Chamaecrista, but it seems not very near any species described by him.

Chamaecrista chamaecristoides (Collard.) Rose.

Cassia chamaecristoides Collard. Hist. Cass. 134. 1816.

Cassia cinerea Cham. & Schlecht. Linnaea **5**: 599. 1830.

Chamaecrista cinerea Pollard; Heller, Cat. N. Am. Pl. ed. 2. 5. 1900, as to synonym, not as to plant.

In 1768 Miller described in his Dictionary a plant from Vera Cruz, Mexico, collected by Houston, which he referred to *Cassia chamaecrista* L. In 1816 Collardon

described his *C. chamaecristoides*, basing it on this same plant of Houston's. In 1830 Chamisso & Schlechtendahl described their *Cassia cinerea* from a plant growing in the sands of Vera Cruz, identical with Houston's plant. This name has since been used, but must now give place to the earlier name of Collardon. Bentham has referred *C. chamaecristoides* to *C. procumbens*, but surely this is a mistake. In a note he states that some of the larger specimens seem to approach *C. cinerea*.

Chamaecrista leptadenia (Greenm.) Rose.

Cassia leptadenia Greenm. Proc. Am. Acad. **41**: 238. 1905.

VICIACEAE.

FIVE NEW SPECIES OF BRONGNIARTIA.

The genus Brongniartia is chiefly Mexican and in Mexico is represented by many species. Of these Mr. Hemsley enumerated 17 in the Biologia Centrali-Americana, but at present the number described (including the following) reaches about 30. While a synopsis of the genus was being prepared several additional species were discovered, five of which are here described.

Brongniartia peninsularis Rose, sp. nov.

A shrub, 2 to 3 meters or more high with many slender, more or less zigzag, branches, when young densely silky-pubescent; stipules leaflike, broadly lanceolate, 10 mm. long; leaflets 5 to 13, lanceolate, acute, 1 to 2 cm. long, with appressed cinereous pubescence on both surfaces; flowers axillary; peduncle 2 to 2.5 cm. long, pubescent, bibracteate at base; bracts probably large; calyx tube glabrous, the lobes pubescent on the margin and inner surface; corolla 1.5 cm. or more long; pods glabrous, shining, 4 cm. long.

Collected by E. W. Nelson and E. A. Goldman about 5 miles southwest of El Potrero, Lower California, October 31, 1905 (no. 7236).

Type U. S. National Herbarium no. 565321.

This species is quite unlike *B. trifoliata*, the only other species from Lower California, as well as the other Mexican species.

Brongniartia lasiocarpa Rose, sp. nov.

Low bush, 30 to 40 cm. high; young branches densely pubescent; leaves small for the genus; leaflets 11 to 17, oblong to orbicular, 5 to 7 mm. long, obtuse, mucronate, glabrate and shining above, somewhat hairy beneath, rather thick, more or less reticulate on both surfaces; flowers axillary; fruiting peduncle only 5 to 7 mm. long, bearing small bractlets near the top; calyx tube and lobes very hairy without; pod 2 cm. long, very pubescent.

Common on hills near Tehuacán, collected by J. N. Rose, August 1, 2, 1901 (no. 5910), and again in September, 1906 (no. 11256, type); and by C. A. Purpus in June, 1903.

This species differs from all others which I have seen in its very hairy pods.

Type U. S. National Herbarium no. 454039.

Brongniartia parvifolia Rose, sp. nov.

A low, spreading shrub 15 to 45 cm. high; young parts very pubescent; leaflets 19 to 31, crowded, narrowly elliptical, mucronate, 6 to 10 mm. long, pubescent on both sides; stipules in size and shape much as the leaflets; peduncles axillary, solitary, about 10 mm. long, pubescent; bracts subtending the calyx ovate, acute, hairy; calyx glabrous, 2-lipped, the tube 3 to 4 mm. long; upper lip 2-toothed; lower lip cut into

3 lanceolate acute lobes, both teeth and lobes pubescent on the margin; corolla "dark red;" pods 2.5 to 3 cm. broad, 1 or 2-seeded.

Collected by Mr. E. W. Nelson on the road between San Geronimo and La Venta, State of Oaxaca, July 13, 1895 (no. 2777).

A peculiar looking species for Brongniartia.

Type U. S. National Herbarium no. 229365.

Brongniartia revoluta Rose, sp. nov.

Shrub 60 to 90 cm. high; leaves rather small for the genus; leaflets 9 to 13, oblong, 4 to 18 mm. long, glabrous above, appressed-pubescent beneath, the margin revolute; flowers axillary; bracts at the base of the tube pubescent; pods cuneate at base, glabrous, 3 to 4 cm. long, 2 or 3-seeded.

Collected by E. W. Nelson on west slope of Mount Zempoaltepec, Oaxaca, July 3 to 13, 1894 (no. 564).

Type U. S. National Herbarium no. 469218.

Brongniartia goldmanii Rose, sp. nov.

Small tree 2 to 3 meters high; pubescence on young parts short, dense, spreading; leaflets 7 to 9, shortly oblong, 2 cm. or less long, rounded or even retuse at apex, pubescent on both surfaces when young, but soon glabrate above; flowers axillary on peduncles 10 mm. or less long; bracts at base of calyx orbicular, 7 mm. long, pubescent; calyx tube hairy; pods subsessile, never exserted above the calyx tube, 4 cm. long, glabrous.

Collected by E. A. Goldman on road from Las Flechas to La Rastra, Sinaloa, February 22, 1899 (no. 322).

Type U. S. National Herbarium no. 360243.

NEW SPECIES AND NEW COMBINATIONS UNDER CRACCA.

The need of a careful revision of the Mexican species known under Tephrosia has long been apparent to the writer, who has several times studied them with the hope of presenting a synopsis, but so many of the older species are still poorly represented in our American herbaria that it has not seemed hitherto nor does it yet seem wise to attempt a revision. Most of the existing descriptions have been studied, however, and a large series of recently collected specimens have been examined, resulting in the description of a number of new species. The substitution of the older name Cracca also requires the making of a number of new combinations, a part of which are here presented. The excuse for publishing thus fragmentarily on this genus is that my correspondents desire names in order that they may publish upon or distribute their material, and particularly that several species are found to be the hosts of fungi and their names are wanted in this connection.

Cracca affinis (S. Wats.) Rose.

Tephrosia affinis S. Wats. Proc. Am. Acad. **21**: 424. 1886.

Cracca cuernavacana Rose, sp. nov.

Stems herbaceous, 60 to 90 cm. high, clothed with rusty appressed hairs; leaflets thin, 9 to 12 pairs, elliptical-oblong, obtuse, mucronate at tip, glabrous above, appressed-pubescent beneath, 15 to 25 mm. long; racemes axillary, rather short and dense-flowered; bracts lanceolate, acuminate; pedicels, calyx, and banner clothed

with rusty appressed pubescence; calyx lobes linear; pods straight, glabrous except a few hairs on the valves.

Collected by C. G. Pringle on wooded slopes of the barranca above Cuernavaca in 1896 (no. 6327).

Type U. S. National Herbarium no. 461989.

Nearest *Cracca affinis*, but with thinner leaflets, denser spikes, and broader bracts.

Cracca diversifolia Rose, sp. nov. FIGURE 24.

Plant suffrutescent, the cespitous stems less than a meter in height, herbaceous, densely pubescent; leaflets 1 to 5, oblong, 3 to 8 cm. long, obtuse, a little narrowed at base, thickish, glabrous above, with densely matted white pubescence beneath; inflorescence a short dense terminal raceme or sometimes becoming paniculate; calyx very pubescent, either white or brownish; petals violet-colored; banner nearly orbicular, pubescent without.

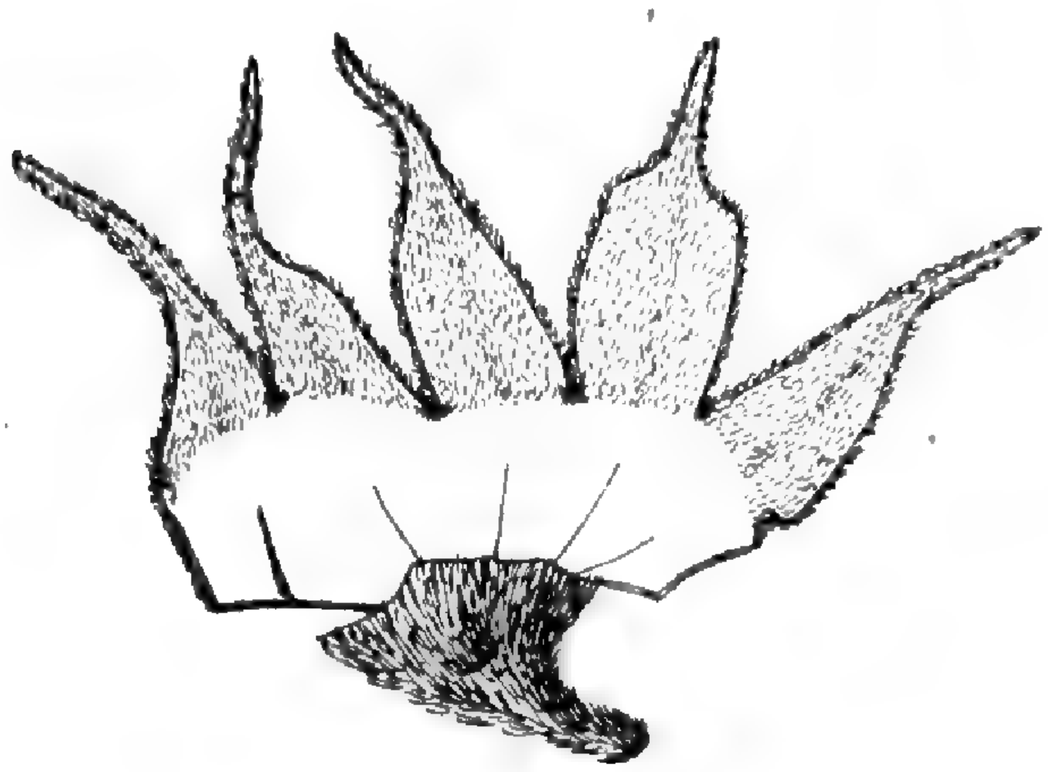

FIG. 24.—Calyx of *Cracca diversifolia*. Scale 2.

Collected by C. G. Pringle near Uruapan, November 14, 1905 (no. 13697).

Type U. S. National Herbarium no. 462389.

Nearest *Cracca sericea*, but still very different.

Cracca langlassei (Micheli) Rose.

Tephrosia langlassei Micheli, Mem. Soc. Phys. Nat. Geneve **34**: 250. *pl. 3*. 1903.

Cracca major (Micheli) Rose.

Tephrosia major Micheli, Mem. Soc. Phys. Nat. Geneve **34**: 251. *pl. 4*. 1903.

Cracca multifolia Rose.

Tephrosia multifolia Rose, Contr. Nat. Herb. **1**: 320. 1895.

Cracca palmeri (S. Wats.) Rose.

Tephrosia palmeri S. Wats. Proc. Am. Acad. **24**: 46. 1889.

Cracca platyphylla Rose, sp. nov. FIGURE 25.

Perhaps shrubby at base, low, about 30 cm. high, densely pubescent; leaves simple, shortly oblong, 4 to 6 cm. long, roundish at apex, subsessile, glabrate above, woolly-pubescent beneath; inflorescence very compact; calyx lanate; banner lanate without; petals "rich rose red;" pods not seen.

Collected by E. W. Nelson on a dry hillside in pine woods between Mascota and San Sebastián, Jalisco, March 14, 1897 (no. 4062).

Type U. S. National Herbarium no. 327035.

Most nearly related to *Cracca major*, but the leaves always simple and covered beneath with a very different pubescence and the inflorescence much more compact.

FIG. 25.—Calyx of *Cracca platyphylla*. Scale 2.

Cracca rhodantha (Brandeg.) Rose.

Tephrosia rhodantha Brandeg. Zoe 5: 201. 1905.

Perennial 60 to 90 cm. high; branches weak and somewhat spreading, hirsute; leaves pinnate; common petiole very short; rachis 10 to 14 cm. long; leaflets 9 to 17, opposite, oblong, 18 to 30 mm. long, obtuse or retuse, appendiculate, strigose-

pubescent; racemes axillary, elongate, 12 to 40 cm. long; rachis flattened; flowers in clusters of threes; pedicels 4 to 6 mm. long; calyx lobes filiform; the two upper slightly united; corolla light purple; banner orbicular, obtuse, 12 to 14 mm. in diameter; keel obtuse; stamens 10, axillary, one free; ovary pubescent; style pubescent on the inner margin; legume linear, 5 to 7.5 cm. long, strigose.

Collected by Dr. E. Palmer in grassy flats at the mouth of a ravine near Lodiego, Sinaloa, October 9 to 15, 1891 (no. 1619).

Type U. S. National Herbarium no. 305315.

Cracca sericea (S. Wats.) Rose.

Clitoria sericea S. Wats. Proc. Am. Acad. **22:** 407. 1887.

Cracca tenella (A. Gray) Rose.

Tephrosia tenella A. Gray, Pl. Wright. **2:** 36. 1853.

THREE NEW SPECIES OF DIPHYSA.

The genus Diphysa, a characteristic arid tropical genus, has a wide distribution in Mexico, but only a few species have been described. After a somewhat exhaustive study of the genus I wish to propose the three following species:

Diphysa occidentalis Rose, sp. nov.

Shrub or small tree, glabrous throughout; leaflets about 20, oblong, acute; inflorescence few-flowered, sometimes only 1 or 2-flowered; calyx glabrous, except the ciliate lobes; petals yellow; pods oblong, much inflated, 4 to 8 mm. long, subsessile.

Specimens examined:

Sonora: Guaymas, Dr. E. Palmer, 1887 (no. 198, type).

Colima: Manzanillo, Dr. E. Palmer, December 1 to 31, 1890 (no. 890); city of Colima, M. E. Jones, July 2, 1892 (no. 177).

Sinaloa: Culiacan, Dr. E. Palmer, August 27 to September 15, 1891 (no. 1498).

Guerrero: Acapulco and vicinity, Dr. E. Palmer, October, 1894, to March, 1895 (no. 106a).

This species seems to have a wide range, extending down the west coast of Mexico from Guaymas to Acapulco.

Type U. S. National Herbarium no. 40567.

Diphysa minutifolia Rose, sp. nov.

Shrub, 1 to 2 meters high; old branches either gray or cherry red; first year's branches puberulent; leaves small, narrow, 2 to 6 cm. long; stipules linear, 2 to 3 mm. long; leaflets numerous, sometimes as many as 40, small, 4 to 6 mm. long, oblong, obtuse, pubescent when young, glabrate in age; inflorescence much reduced, sometimes only 1 or 2-flowered; bractlets not seen, doubtless caducous; calyx slightly pubescent, perhaps becoming glabrate; ovary pubescent; pods 4 to 5 cm. long, inflated.

Collected by C. G. Pringle in a barranca near Cuernavaca, Morelos, June 25, 1896 (no. 6876, type), and near Yautepec, Morelos, by C. G. Pringle, May, 1904 (no. 11963); also at the latter place by Rose and Painter, August, 1903 (no. 6568).

Type U. S. National Herbarium no. 491996.

This species is not near any other Mexican species.

Diphysa echinata Rose, sp. nov.

Low shrub; young parts with some soft pubescent and many stiff yellow, almost prickly hairs; leaflets about 12, orbicular to oblong, 1.5 to 2 cm. long, very thin, glabrous above, very pale and puberulent beneath; racemes about 6-flowered; pedicels slender, 1 to 2 cm. long; bractlets at base of calyx ovate, 10 to 12 mm. long; calyx tube glabrous, the margin of the lobes ciliate; corolla yellow, 2 cm. long; pods not seen.

Collected by J. N. Rose between Rosario and Colomas, July 12, 1897 (no. 1603).

Type U. S. National Herbarium no. 300448.

NEW SPECIES AND NEW COMBINATIONS IN PAROSELA.

I have published in previous numbers of the series [a] two short papers containing many species. There is still a considerable number of the so-called Daleas which have not been transferred to Parosela, of which some are not known to me. The following list represents species which either are new or are old species which I have recently studied and believe to belong to Parosela.

Through the kindness of Col. D. Prain, Director of the Royal Botanic Gardens, Kew, and Mr. W. Botting Hemsley I have obtained fragments from seven types of Dalea belonging to the Kew Herbarium, all but one being of species described by Mr. Hemsley himself. Three of these not already transferred to Parosela are here placed under that name.

Parosela anthonyi (Brandeg.) Rose.

Dalea anthonyi Brandeg. Erythea **7**: 2. 1899.

Parosela campylostachya Rose, sp. nov.

Perhaps annual; branches glabrous or nearly so, bearing prominent glands; leaflets 21 to 45, glabrous, 2 to 3 mm. long, the margins revolute, bearing large glands beneath, glandless above; racemes short-peduncled, many-flowered; calyx 10-ribbed, glabrous without, bearing 1 or rarely 2 large glands between the ribs; teeth short and broad, hairy within; petals purplish.

Collected by Dr. C. G. Pringle near Cieneguilla, Oaxaca, November 1, 1894 (no. 5657).

Type U. S. National Herbarium no. 305786.

This species was originally distributed under the name *Dalea nutans*, to which it is not closely related. It is very near *Parosela lasiostoma* Rose, but has more numerous and smaller leaflets, these more inclined to be revolute.

Parosela capitata (S. Wats.) Rose.

Dalea capitata S. Wats. Proc. Am. Acad. **25**: 146. 1890.

Parosela crassifolia (Hemsl.) Rose.

Dalea crassifolia Hemsl. Biol. Centr. Am. **1**: 238. 1880.

Parosela hospes Rose, sp. nov.

A slender shrub 2 to 3 meters high; branches slender, perfectly glabrous, more or less purplish; leaves glabrous throughout; leaflets 5 to 7, oblong to spatulate, retuse, sometimes simply rounded at apex, 6 to 10 mm. long, the under surface covered with glands, the upper surface simply pitted; inflorescence a weak terminal raceme 5 to 6 cm. long; bracts broadly ovate, acute, glabrous, very glandular; pedicels short but distinct; calyx tube short, 2 to 3 mm. long, at first very silky without, the teeth oval and ciliate, the lower tooth a little longer; petals creamy white to pale rose color; stamens 10; ovary somewhat hairy, containing 2 ovules.

Collected by C. G. Pringle in the Sierra Madre above Monterey, in 1888 (no. 1904, type) and 1903 (no. 11417); also by Dr. E. Palmer in the Caracol Mountains, Coahuila, in 1880 (no. 210).

Type U. S. National Museum no. 24351.

Dr. S. Watson in reporting on Dr. E. Palmer's plants of 1880 calls this plant a variety of *Dalea frutescens*, but does not give it a name. It differs strikingly from that species in several respects. The flowers are in racemes instead of spikes, the calyx

[a] Contr. Nat. Herb. **8**: 302. 1905; **10**: 103. 1906.

tube is silky-pubescent instead of glabrous, the rachis is glabrous not hairy, the leaflets are fewer and larger, and it has a different geographical range.

The specific name is given as this plant is the host of *Apodanthes pringlei* S. Wats.

Parosela lutea (Cav.) Rose.

Psoralea lutea Cav. Ic. **4:** 12. *pl. 325.* 1797.

Dalea lutea Willd. Sp. Pl. **3:** 1341. 1801.

Parosela macrostachya (Moric.) Rose.

Dalea macrostachya Moric. Mem. Soc. Phys. Geneve **6:** 534. *pl. 5.* 1833.

Parosela saffordii Rose, sp. nov.

Low bushy shrubs; branches often short and stout, glabrous; stipules persistent, purplish; leaflets 9 to 13, oblanceolate to spatulate, 2 to 3 mm. long, retuse, glabrous, glandular beneath, rather thickish, the margins often revolute; rachis of leaf rather thickish; stipels distinct; heads shortly peduncled, often appearing sessile; bracts lanceolate, acuminate, ciliate; calyx hairy, the teeth filiform nearly as long as the tube; petals purplish; keel and wings attached to the stamen tube near its base.

Collected by William E. Safford, February 3, 1907 (no. 1246). The same species was collected in 1880 (no. 208) by Dr. E. Palmer in the Sierra Madre 40 miles south of Saltillo and distributed as *Dalea polycephala*. *D. polycephala*, however, has pubescent stems and leaves.

Type U. S. National Herbarium no. 573293.

This species is much nearer *P. formosa*, but has narrow bracts and shorter calyx teeth. The species is named in honor of Lieutenant William E. Safford, now of the Department of Agriculture.

Parosela schaffneri (Hemsl.) Rose.

Dalea schaffneri Hemsl. Diag. Pl. Nov. **1:** 7. 1878.

Near *P. lasiostoma* Rose.

Parosela similis (Hemsl.) Rose.

Dalea similis Hemsl. Diag. Pl. Nov. **1:** 7. 1878.

Parosela tomentosa (Cav.) Rose.

Psoralea tomentosa Cav. Ic. **3:** 21. *pl. 240.* 1794.

Dalea tomentosa Willd. Sp. Pl. **3:** 1341. 1801.

MISCELLANEOUS NEW SPECIES.

The following species are of genera which have been wholly or in part revised by the writer.

Crotalaria gloriosa Rose, sp. nov.

Slender shrub about 2 meters high, all the young parts covered with a dense golden-yellow pubescence; leaflets 3, lanceolate, 4 to 6 cm. long, acute, densely pubescent on both surfaces; inflorescence a long, slender, many-flowered raceme; bracts linear, persistent; calyx very pubescent; corolla large, 15 mm. long, very hairy without; keel strongly pointed; pods densely silky-pubescent.

Collected by Rose and Painter in mountains near Iguala, August 10 to 12, 1905 (no. 9412).

Type U. S. National Herbarium no. 452900.

This is perhaps nearest *C. molliculata* and *C. eriocarpa*, but the petals are very hairy without, the upper surface of the leaves much more pubescent, etc.

Indigofera tumidula Rose, sp. nov.

Stem soft-wooded, 6 meters or more in height; branches herbaceous, appressed-pubescent; leaflets 3 to 7, oblong, 3 to 4 cm. long, rounded at base and apex, mucronately tipped, slightly appressed-pubescent on both surfaces, paler beneath;

raceme 7 to 12 cm. long; flowers not seen; fruit short and turgid, 5 mm. or less long, appressed-pubescent, 2-seeded.

Collected by Dr. C. G. Pringle in Iguala Cañon, Guerrero, September 22, 1905 (no. 13693).

Type U. S. National Herbarium no. 462385.

This species in the shape and size of its fruit suggests *I. densiflora*, but it has fewer and larger leaflets.

Phaseolus (Leptospron) lozanii Rose, sp. nov.

A high-climbing vine; stems glabrate; leaflets 3, ovate, acuminate, 5 to 9 cm. long, glabrous on both surfaces; inflorescence including the peduncle 20 to 25 cm. long; bracts orbicular, striate; bractlets ovate, small; calyx tube glabrous without; upper lip broad and short; lower lip 3-lobed, ovate, acute, the lower lobe a little longer; banner broad, purplish, glabrous without; immature pods pubescent.

Collected by Dr. C. G. Pringle near Uruapan, 1907 (no. 10358).

Type U. S. National Herbarium no. 462493.

Perhaps nearest *P. cuernavacana*, but the leaflets decidedly acuminate, and the stems nearly glabrous.

Ramirezella pringlei Rose, sp. nov.

Tall woody vines; leaflets 3, broadly ovate, acuminate, 6 to 10 cm. long, early glabrate, slightly reticulated; inflorescence somewhat pubescent; pedicels 10 mm. or less long; calyx tube short and broad, the lobes ciliate; the upper lobe broad and obtuse; the 3 lower lobes ovate, acute; corolla violet, 2 cm. long.

Collected by Dr. C. G. Pringle in Iguala Cañon, October 2, 1906 (no. 13822).

Type U. S. National Herbarium no. 462398.

Ramirezella buseri (Micheli) Rose.

Phaseolus buseri Micheli, Mem. Soc. Phys. Nat. Geneve **34**: 263. *pl. 13.* 1903.

Robinia pringlei Rose, sp. nov.

A medium-sized, apparently spineless tree; young branches with short, appressed, often scanty pubescence; young leaves with dense, silky, brownish pubescence; mature leaves 20 to 30 cm. long; leaflets 13 to 15, shortly oblong, 4 to 6 cm. long, rounded at base or broadly cuneate, rounded at apex, paler beneath, scantily pubescent on both surfaces; racemes 10 to 15 cm. long; pedicels 10 to 12 mm. long; calyx tube broad, the upper lip notched, the lower lip 3-lobed; pod 3 to 6 cm. long.

Collected by C. G. Pringle in valley near Tula, State of Mexico, altitude 19 to 40 meters, March 23, 1906 (no. 10218).

Type U. S. National Herbarium no. 462258.

LINACEAE.

A NEW SPECIES OF LINUM.

Linum lasiocarpum Rose, sp. nov.

Annual, simple or more or less branched, 1.5 to 30 cm. high, slender, glabrous except some hairs in the inflorescence; lower leaves generally in whorls, obovate, 10 mm. or less long, obtuse, entire, not at all glandular; upper leaves opposite or alternate, narrower, sometimes acute, rarely toothed; pedicels very short, 1 mm. or less long, densely pilose; sepals lanceolate, acute, with gland-bearing margins, the three nerves prominent and wing-like; petals yellow, 4 mm. long; styles distinct to the base; carpels pilose.

Collected by C. G. Pringle near Monterey, April 15, 1906 (no. 10209).

Near *L. cruciatum*, but leaves not glandular-serrate and the sepals more strongly nerved.

Type U. S. National Herbarium no. 462252.

RUTACEAE.

THE GENUS MORKILLIA.

The following account of Morkillia, which recently appeared in the Smithsonian Miscellaneous Collections, is here reprinted (without change except in the citations) for the sake of connection with my other Mexican studies.

The genus Chitonia has hitherto been represented only by material collected many years ago. Until now it has rested upon a single species, *C. mexicana*. Fruiting specimens of this were collected in 1905 near Tehuacán, Mexico, and in 1906 fruit and flowers were obtained from the same place. Some years earlier, Mr. E. W. Nelson had collected in Northern Mexico a very different species, which is here described as new.

The name Chitonia of Mociño & Sessé is a homonym of the Chitonia of D. Don, and hence a new name is here proposed. The genus is named Morkillia, in honor of Mr. W. L. Morkill, general manager of the Mexican Southern Railroad, who has taken a great interest in and has contributed to the development of our explorations in southern Mexico.

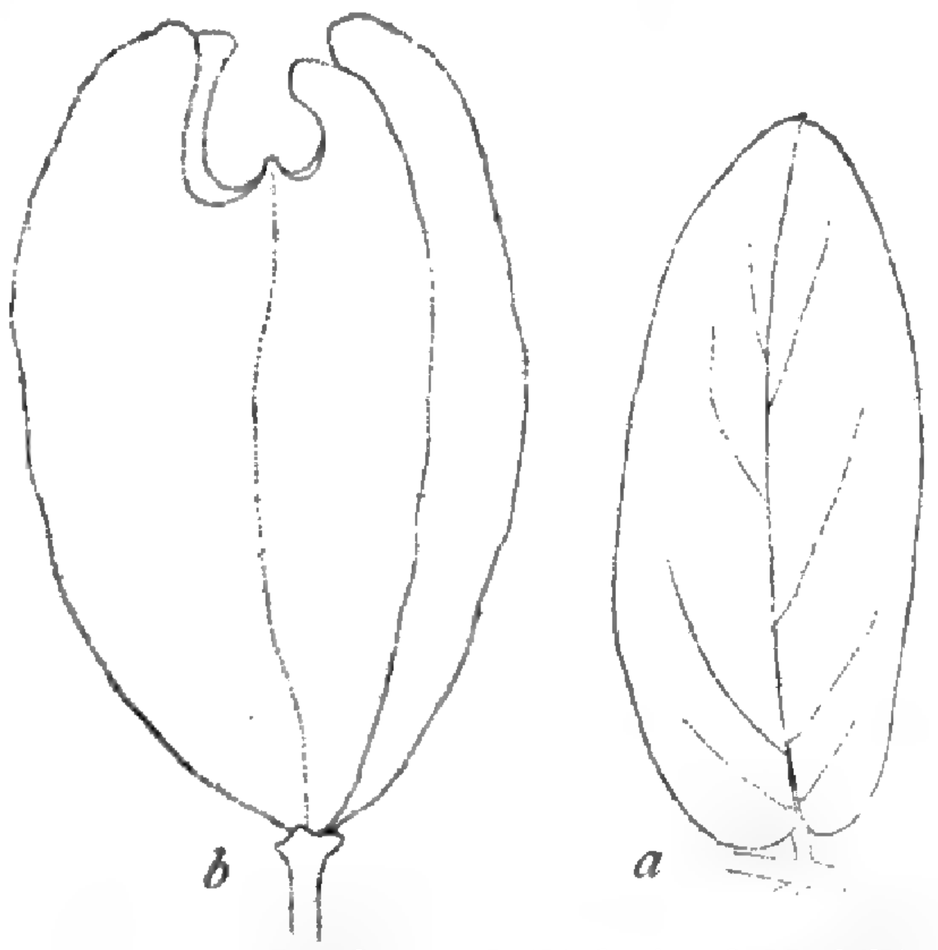

FIG. 26.—(*a*) Leaflet and (*b*) fruit of *Morkillia mexicana*. Natural size.

Morkillia mexicana (Moc. & Sessé) Rose & Painter, Smithson. Misc. Coll. **50**: 33. 1907. FIGURE 26.

Chitonia mexicana Moc. & Sessé; DC. Prod. **1**: 707. 1824.

Shrub 3 to 5 meters high; young branches densely pubescent; lateral leaflets 4 to 7 pairs, oblong, obtuse or at first acute, shortly petiolulate, very pubescent on both surfaces, 3 to 5 cm. long; flowers large and showy, 8 to 9 cm. in diameter; petals strongly notched, deep purple; fruit 4 to 5 cm. long with 4 lateral wings, these free at the top and more or less incurved, dehiscing when mature, exposing the red aril of the seeds; seeds white with a black spot at the tip.

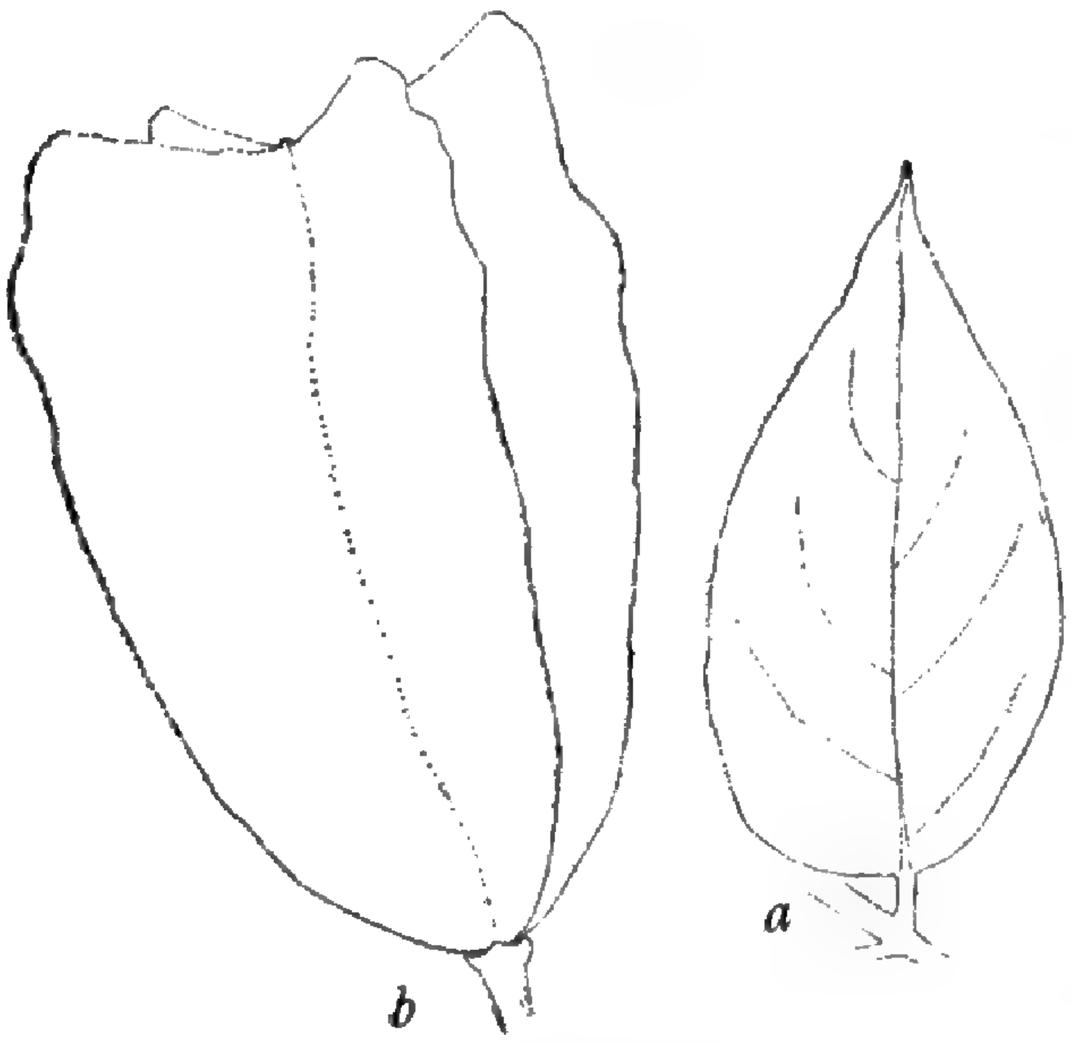

FIG. 27.—(*a*) Leaflet and (*b*) fruit of *Morkillia acuminata*. Natural size.

Specimens examined:

Puebla: Near Tehuacán, Rose & Painter, August 30, 1905 (no. 9992); J. N. & J. S. Rose, September 2, 1906 (no. 11278); C. A. Purpus, July, 1905 (no. 1315).

Morkillia acuminata Rose & Painter, Smithson. Misc. Coll. **50**: 34. 1907. FIGURE 27.

Near *Morkillia mexicana*, but leaflets paler above, ovate and acuminate, more densely pubescent, flowers much smaller (6 cm. or less broad), petals less notched, and fruit broader and nearly truncate at apex.

Collected by Mr. E. W. Nelson on road over mountain between Victoria and Jaumave Valley, altitude 240 to 750 meters, May 31, 1898 (no. 4444).

THE MEXICAN SPECIES OF PTELEA.

Dr. E. L. Greene has recently published an exhaustive treatment of the genus Ptelea in these contributions,[a] in which 14 Mexican species are described, all but one of them as new. Three of these, however, he has since segregated as a new generic type under the name Taravalia. Below will be found the eleven species of Ptelea attributed to Mexico. Dr. Greene's descriptions of three of these, two based by him on material collected by the writer, the third earlier established by the writer on material of Mr. Pringle's, are reprinted in full.

Ptelea acutifolia Greene & Rose, Contr. Nat. Herb. **10:** 68. 1906.

"Twigs of the season dull chestnut-color, rather sharply and angulately rugose and puberulent, the older glabrate, darker, obtusely and tortuously striate: leaves firm but not subcoriaceous, deep green above, paler beneath and villous-strigulose, definitely crenulate, all on elongated petioles mostly 6 to 8 cm. long; odd leaflet lance-elliptic, very acute at both ends, 5.5 to 8 cm. long, the pair usually but little smaller and of the same outline, being scarcely inequilateral: samaras small for the foliage, transversely subquadrate-orbicular to quite orbicular, the largest and most quadrate 2 cm. wide, 1.5 cm. long, such subtruncate at both ends; body very round-ovoid, hardly as broad as the wing, lightly circumvallate, not at all sharply transverse-rugose, moderately punctate; style and stipe nearly equal.

"State of Jalisco, Mexico, on the road between Huejuquilla and Mesquitec, August 25, 1897, Dr. J. N. Rose, no. 2580, as in the National Herbarium. Species not otherwise known, and remarkable for the great length of the petioles, the leaflets not acuminate, though very acute."

Ptelea coahuilensis Greene, Contr. Nat. Herb. **10:** 61. 1906.
Distribution: Coahuila.

Ptelea cuspidata Greene, Contr. Nat. Herb. **10:** 62. 1906.
Distribution: Chihuahua.

Ptelea glauca Greene, Contr. Nat. Herb. **10:** 64. 1906.
Distribution: Sonora.

Ptelea laetissima Greene & Rose, Contr. Nat. Herb. **10:** 69. 1906.

"Twigs of the season dull red-brown, lightly rugulose, puberulent, the older dull brown, glabrate, smoothish: leaves small, of a light very bright green above, light dull green beneath, with faint trace of minute scattered hairiness on both faces, but to the unaided eye glabrous; odd leaflet lanceolate, acutish at both ends, about 5 cm. long, the pair similar and hardly inequilateral, only about half as large, all sessile, obsoletely crenulate: samaras large for the foliage, greenish in maturity, orbicular, about 1.8 cm. long and broad, truncate at base, emarginate at apex; body oval, of less than the width of the wing, prominently rugose, but the wrinkles not very continuously transverse, punctuation not strong; style and stipe nearly equal, both slender yet prominent.

"Near Tehuacán, State of Puebla, Mexico, September, 1905, collected by Messrs. Rose, Painter, and Rose (no. 9927), type in the National Herbarium. The specimens being at that date in fruit nearly matured, and with foliage bright and untar-

[a] Contr. Nat. Herb. **10:** 49–78. 1906.

nished as if that of early summer at the North, are evidence that the species comes into leaf and flower only late in summer, after the beginning of the rainy season.

"We have in the United States no Ptelea to equal this in the beauty of its bright green almost brilliant foliage, a strong tinge of which is held by even the mature fruit."

Ptelea megacarpa Rose, Contr. Nat. Herb. **10:** 68. 1906.

"Twigs tortuously striate rather than rugulose, and with glands between the lines; bark chestnut-colored when mature, glabrous: leaves large, of thin texture, vivid dark-green on both faces, scarcely lighter beneath and not in the least glaucescent, glabrous; leaflets ovate-elliptic, the pair almost or quite as large as the odd one, oblique rather than notably inequilateral, all cuspidately acuminate, entire, the odd one 7 to 12 cm. long: samaras very large, thin and flat, the circumscription exactly orbicular, abruptly subcordate at base and equally obcordate-notched at apex, both the length and breadth about 3.5 cm.; body small in proportion to the wing, circumvallate, transverse-rugose, almost dotless, as also the wing; style of thrice the length of the stipe.

"Dr. Rose establishes this handsome species on Mr. Pringle's no. 8868 (type in the National Herbarium), from the State of Hidalgo, Mexico; and it has been so distributed.

"Mr. Pringle reports it to attain the dimensions of a small tree at about 1,600 meters altitude below Trinidad Iron Works, where it was obtained by him June 2, 1904. Flowers were collected May 10, but unhappily none but the pistillate; so that the character of the filaments can not be given."

Ptelea obtusata Greene, Contr. Nat. Herb. **10:** 61. 1906.
Distribution: Coahuila.

Ptelea pumila Greene, Contr. Nat. Herb. **10:** 61. 1906.
Distribution: Coahuila.

Ptelea sancta Greene, Contr. Nat. Herb. **10:** 63. 1906.
Distribution: Sonora.

Ptelea scutellata Greene, Contr. Nat. Herb. **10:** 62. 1906.
Distribution: Chihuahua.

Ptelea subintegra Greene, Contr. Nat. Herb. **10:** 61. 1906.
Distribution: Durango.

THE SPECIES OF TARAVALIA.

Three species of Taravalia have been described, all coming from Lower California. They are as follows:

Taravalia aptera (Parry) Greene, Leaflets **1:** 223. 1906.
Ptelea aptera Parry, Proc. Davenp. Acad. **4:** 39. 1884.
Distribution: Lower California.

Taravalia nucifera Greene, Leaflets **1:** 222. 1906.
Ptelea nucifera Greene, Contr. Nat. Herb. **10:** 75. 1906.
Distribution: Lower California.

Taravalia obscura Greene, Leaflets **1:** 223. 1906.
Ptelea obscura Greene, Contr. Nat. Herb. **10:** 76. 1906.
Distribution: Lower California.

SIMARUBACEAE.

THE MEXICAN SPECIES OF CASTELA.

The species of Castela are very characteristic desert undershrubs, and their distribution ought to be carefully worked out. The study of our very scanty material has shown one new species, which is here described. Also the variety of *C. nickelsoni* is here raised to specific rank. The four Mexican species, one of which is very doubtful, are the following:

Castela lychnophoroides Liebm. Vidensk. Meddel. **1853:** 110. 1854.

This plant is an uncertain Castela. I have not yet been able to find it at the type locality. The description suggests that it may not belong to this genus.

Castela peninsularis Rose, sp. nov.

Thorny shrub; pubescence on branches and thorns short, dense, velvety, yellowish; leaves oblong, 1 to 2 cm. long, entire or few-toothed, somewhat revolute, the pubescence on the under surface soft but not matted; flowers axillary, red; stamens pubescent.

Collected by C. A. Purpus at San José del Cabo, Lower California, March, 1901 (no. 244).

Distributed as *C. tortuosa*, but different in its leaves and pubescence.

Castela texana (Torr. & Gr.) Rose.

Castela nickelsoni texana Torr. & Gr. Fl. N. Am. **1:** 680. 1840.

Castela texana has generally passed as the *Castela nickelsoni* of the West Indies, a very different species. Its relationship is more closely with *C. tortuosa* of South Mexico, from which it differs in its somewhat narrower leaves, these more strongly reticulated beneath and in its more yellowish pubescence.

Castela tortuosa Liebm. Vidensk. Meddel. **1853:** 110. 1854.

This species has long been a desideratum in our larger herbaria. In 1905 it was collected by Rose and Painter from near the type locality, Tehuacán, Mexico.

ADDITIONAL SPECIES OF TEREBINTHUS.

In No. 5 of this series a list of 50 species of Terebinthus was given.[a] Since its preparation several new species have come to hand and these with several others which had been overlooked are here presented.

Terebinthus acuminata Rose, sp. nov.

Small shrub, 3 to 4 meters high, the trunk and older branches shedding the bark and becoming reddish-brown; leaves large, pinnate; rachis of leaf terete, pubescent; leaflets 5 to 7, broadly lanceolate, acuminate, 6 to 10 cm. long, glabrous or nearly so above, somewhat pubescent beneath, especially on the veins; fruit in rather dense racemes, shortly oblong, labrous.

Collected by J. N. Rose and Joseph H. Painter on a hill near Chapala, Jalisco, October 5, 1903.

Type U. S. National Herbarium no. 451271.

Terebinthus attenuata Rose, sp. nov.

Tree; branches even when quite young perfectly glabrous; leaves large, pinnate; leaflets 5 to 7, lanceolate, long-attenuate, rounded at base, 8 to 12 cm. long, rather

[a] Contr. Nat. Herb. **10:** 117–122. 1906.

thin (at least on flowering specimens), perfectly glabrous on both surfaces except for some tufts of hairs in the lower axils of the veins on the under surface; racemes slender, clustered at the ends of the second-year branches, 10 to 15 cm. long, glabrous; pedicels slender, 1 to 2 cm. long, glabrous; immature fruit glabrous.

Collected by J. N. Rose near Colomas, Sinaloa, July 16, 1897 (no. 3213).

Type U. S. National Herbarium no. 302178.

Terebinthus diversifolia Rose.

Bursera diversifolia Rose, Contr. Nat. Herb. **5:** 113. 1897.

Terebinthus laxiflora (S. Wats.) Rose.

Bursera laxiflora S. Wats. Proc. Am. Acad. **24:** 44. 1889.

This is a very distinct species. The material from Lower California referred to this species is quite distinct and will be taken up under a different specific name by Mr. T. S. Brandegee.

Terebinthus nelsonii Rose.

Bursera nelsonii Rose, Contr. Nat. Herb. **3:** 314. 1895.

Terebinthus pilosa (Engler) Rose.

Bursera graveolens pilosa Engler in DC. Monog. Phan. **4:** 49. 1883.

Terebinthus pubescens (Schlecht.) Rose.

Elaphrium pubescens Schlecht. Linnæa **16:** 527. 1842.

Rachis of leaf winged; leaflets 7, 3 to 5 cm. long, narrowly elliptical, acute and acuminate, cuneate at base, entire below, coarsely and irregularly toothed above, pubescent on both sides; inflorescence as long as the leaves; calyx teeth 4, very short, ciliate; petals 4, elliptical, obtuse, somewhat narrowed at base, glabrous.

Type locality: "E campeche."

Probably common in Yucatan.

This species is not recognized by Dr. Engler or other writers on this genus. As suggested by Schlechtendal, it is near *Bursera graveolens*, but it is apparently distinct. Before studying this species I had segregated from *T. graveolens* material from Yucatan, which I now find answers very well to *T. pubescens*.

Terebinthus trijuga (Ramirez) Rose.

Bursera trijuga Ramirez, Anal. Inst. Med. Nac. **2:** 16. 1896.

MALPIGHIACEAE.

THRYALLIS.

The genus Thryallis was published by Linnæus in the second edition of his Species Plantarum[a] basing it upon a single species *T. brasiliensis.* In 1829 Martius described two additional species *T. longifolia* and *T. latifolia.*

These two species, however, were soon found not to be congeneric with the original species, but instead of being taken out as a new generic type,[b] were allowed to remain as Thryallis, while the true type of that genus was transferred to Galphimia[c]. The following species either are new or have been published under Galphimia.

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[a] Page 554.

[b] Otto Kuntze in 1891 (Rev. Gen. Pl. **1:** 88) gave the name Hemsleyna to these species.

[c] Cav. Ic. **5:** 61. 1799.

KEY TO MEXICAN SPECIES.

Leaves very pubescent ..... *T. vestita.*
Leaves quite glabrous or nearly so.
  Leaves sessile ..... *T. sessilifolia.*
  Leaves distinctly petioled.
    Stems roughened ..... *T. tuberculata.*
    Stems not roughened.
      Glands borne on the petiole near its middle.
        Inflorescence glabrous ..... *T. palmeri.*
        Inflorescence not glabrous.
          Under surface of leaf more or less pubescent ..... *T. hirsuta.*
          Under surface of leaf glabrous..... *T. humboldtiana.*
Glands borne on or at the base of the blade.
  Gland stalked ..... *T. humilis.*
  Glands sessile.
    Mature leaves linear to linear-lanceolate. *T. linifolia.*
    Mature leaves broader than linear.
      Internodes longer than the leaves.
        Petioles nearly glabrous; flowers tinged with red..... *T. montana.*
        Petioles very pubescent; flowers tinged with green..... *T. angustifolia.*
      Internodes shorter than the leaves.
        Leaves lanceolate..... *T. gracilis.*
        Leaves oblong.
          Upper leaves acute; inflorescence lax ..... *T. glauca.*
          All leaves obtuse; inflorescence strict ..... *T. multicaulis.*

UNCERTAIN SPECIES.

T. grandiflora (Bartl.) Kunze.
T. glandulosa (Cav.) Kunze.
T. latifolia (Bartl.) Kunze.
T. paniculata (Bartl.) Kunze.

Thryallis angustifolia (Benth.) Rose.

Galphimia angustifolia Benth. Bot. Sulph 9. *pl. 5.* 1844.

This seems to be the common species of the west coast of Mexico, especially of Lower California. This species has been confused with *G. linifolia* Gray but is apparently distinct. Even if the two should be combined *T. angustifolia* would be the proper name.

Thryallis glandulosa (Cav.) Kuntze.

Thryallis glauca (Cav.) Kuntze.

Thryallis gracilis (Bartl.) Kuntze.

Thryallis grandiflora (Bartl.) Kuntze.

Thryallis hirsuta (Cav.) Kuntze.

Thryallis humboldtiana (Bartl.) Kuntze.

Thryallis humilis Rose, sp. nov.

Low bushy shrub, 30 to 60 cm. high, slightly pubescent; leaves lanceolate, 4 to 7 cm. long, 2 to 3 cm. broad, glabrous, very pale beneath, acute, tapering at base into a short petiole, somewhat revolute-margined at least in herbarium specimens, bearing a stalked gland on each margin a little distance above the base, but these sometimes

wanting; racemes terminal, elongated, sometimes 20 cm. long; pedicels slender, 1 to 1.5 cm. long; sepals glabrous, obtuse, alternating with small gland-tipped appendages; flower buds reddish; petals yellow, obtuse, 8 mm. long; fruit glabrous.

Collected by J. N. Rose on the road between Concepción and Acaponeta, Tepic, July 29, 1897 (no. 1907).

Type U. S. National Herbarium no. 300792.

Thryallis latifolia (Bartl.) Kuntze.

Thryallis linifolia (A. Gray) Kuntze.

Thryallis montana Rose, sp. nov.

A small shrub 1 to 2 meters high; branches reddish, glabrous; blade broadly ovate, 3 to 4 cm. long, 15 to 25 mm. broad, acute or sometimes rounded at apex, rounded or broadly cuneate at apex, bearing two sessile glands at base; petiole 5 to 7 mm. long; racemes 4 to 10 cm. long, slightly pubescent; pedicels 10 to 12 mm. long, jointed much below the middle; sepals oblong, glabrous, obtuse; petals 8 mm. long including the slender claw; fruit 4 mm. long.

Collected by J. N. Rose in southern Durango, August 15, 1897 (no. 2309).

Somewhat resembling *T. ovata*, but glands nearer the base of the leaf blade, the flowers smaller, etc.

Type in U. S. National Herbarium no. 301220.

Thryallis multicaulis (A. Juss.) Kuntze.

Thryallis palmeri Rose.

Galphimia glandulosa Rose, Contr. Nat. Herb. **5**: 137. 1897, not Cav. 1899.

Thryallis paniculata (Bartl.) Kuntze.

Thryallis sessilifolia Rose.

Galphimia sessilifolia Rose, Contr. Nat. Herb. **3**: 313. 1895.

Thryallis tuberculata Rose, sp. nov.

Low shrub, the young branches tuberculately roughened, each little knob crowned by a two-branched brown hair; leaf oblong, 3 to 5 cm. long, 7 to 12 mm. broad, obtuse, cuneate at base; petiole and mid-vein roughened like the petiole, otherwise glabrous, pale beneath, bearing two stalked glands at base of blade; raceme 10 to 15 cm. long, roughened like the stems; pedicels 10 mm. or so long; sepals oblong, obtuse, 3 mm. long; petals 8 mm. long; fruit not seen.

Collected by J. N. Rose between Rosario and Colomas, July 12, 1897 (no. 1607).

Not closely related to any other Mexican species. Easily distinguished by its roughened stem.

Type U. S. National Herbarium no. 300453.

Thryallis vestita (S. Wats.) Rose.

Galphimia vestita S. Wats. Proc. Am. Acad. **21**: 421. 1886.

EUPHORBIACEAE.

A NEW COMBINATION IN CNIDOSCOLUS AND A NEW SPECIES OF MOZINNA.

The genus Jatropha as treated by Müller[a] and most writers since his time contains several well-marked genera with good fruit, flower, and habit characters. Dr. J. K. Small[b] has recently restored Cnidoscolus Pohl. and Mozinna Ort.

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[a] DC. Prod. **15**: 1076. 1864–66.

[b] Fl. Southeast. U. S. 706. 1903.

Cnidoscolus palmeri (S. Wats.) Rose.

Jatropha palmeri S. Wats. Proc. Am. Acad. **24**: 76. 1889.

This rare species has heretofore been known from a single flowering plant found by Dr. E. Palmer near Guaymas, Mexico. Messrs. Nelson and Goldman have now collected both flowering and fruiting specimens some 20 miles east of San Ignacio, Lower California. These specimens, unlike the type material, have the long stinging hairs so characteristic of *C. urens* and *C. stimulosa*.

The inflorescence consists of only a few flowers; the fruit is shortly oblong in outline and about 1 cm. long.

Mozinna pauciflora Rose, sp. nov. PLATE XXII.

A large compact bush often with many stems, 3 to 4 meters high and often as broad; branches usually stunted, very young branches densely pubescent but older ones glabrate and reddish; leaves and flowers often borne in fascicles from old nodes on very short spurs, these crowded with the old stipules and persistent peduncles; leaves simple, rather thin, broadly obovate to spatulate, 4 to 6 cm. long, rounded at apex, narrowed at base into a short petiole, entire, softly pubescent on both surfaces; stipules dissected into linear segments, these brown-pubescent and persistent; flowers solitary, or sometimes several from the same spur, very short-peduncled, 1 to 2 mm. long; calyx 3 mm. long, green, pubescent, its 5-lobes about 2 mm. long; corolla red or pinkish, somewhat urn-shaped, 5 to 6 mm. long, pubescent without; stamens in two whorls, the longer ones reaching the mouth of the corolla; female flowers not seen; fruit glabrous, strongly flattened, 2 cm. broad, 1.5 cm. high, 2-celled; seeds globular, 1 cm. in diameter.

Common on the dry hills east of Tehuacán, Puebla.

Collected by Rose and Painter in August and September, 1905 (no. 9950), and by Rose and Rose, September 1, 1906 (no. 11247, type).

Type U. S. National Herbarium no. 454030.

EXPLANATION OF PLATE XXII.—Fig. *a*, branch; *b*, flower; *c*, stamens; *d*, gland; *e*, fruit; *f*, seed. Figs. *a*, *e*, and *f*, natural size; *b*, *c*, and *d*, scale 2.

CELASTRACEAE.

NEOPRINGLEA AND ITS TWO SPECIES.

In July, 1891, Dr. S. Watson proposed the name Neopringlea for Llavea Liebm., while in the same year, but later (November), Dr. Otto Kuntze proposed also the name Henningsocarpus.

The relationships of this genus are still doubtful, but for the present I shall leave it in Celastraceae, where it usually has been placed.

The two species are as follows:

Neopringlea integrifolia (Hemsl.) S. Wats. Proc. Am. Acad. **26**: 135. 1891.

Neopringlei viscosa (Liebm.) Rose.

Llavea viscosa Liebm. Vidensk. Meddel. **1853**: 96. 1854.

Collected by J. N. Rose and Jos. H. Painter, near Tehuacán, Puebla, August and September, 1905 (no. 10021), and by J. N. and J. S. Rose near the same locality September 2 and 4, 1906 (nos. 11279 and 11432).

TWO NEW SPECIES OF WIMMERIA.

Since my synopsis of the genus Wimmeria was published[a] Prof. Radlkofer has added one new species, and two others are now proposed.

[a] Contr. Nat. Herb. **5**: 129. 1897.

MOZINNA PAUCIFLORA ROSE.

Wimmeria guatemalensis Rose, sp. nov.

Shrub with many short stubby branches; branches very pubescent; leaves small, 8 to 12 mm. long, obovate to spatulate, thickish, obtuse to retuse, pubescent on both surfaces, subentire; flowers not seen; pedicels pubescent; fruit 6 to 10 mm. long, glabrous.

Collected by E. W. Nelson near Nenton, Guatemala, December 13 to 15, 1895 (no. 3522).

This species is nearest *W. pubescens*, from which it is distinguished by its somewhat different leaves and glabrous fruit.

Type U. S. National Herbarium no. 274039.

Wimmeria lanceolata Rose, sp. nov.

Shrub 3 to 5 meters high; branches pale, glabrous; leaves lanceolate, 10 cm. or more long including the slender petiole, cuneate at base, long-acuminate, glabrous, coarsely crenate; flowers in small cymes; sepals orbicular, ciliate; petals cream-colored; fruit 12 to 18 mm. broad, 10 mm. or less high, strongly notched at apex, glabrous.

Collected by J. N. Rose and Jos. H. Painter near Iguala, Guerrero, August 10, 1905 (no. 9287, type), and by C. G. Pringle near Balsas Station, Guerrero, September 27, 1900 (no. 13511).

Type U. S. National Herbarium no. 452771.

Nearest *W. persifolia* Radlk., from which it may be known by its more lanceolate leaves not at all pubescent on the midrib and with coarser teeth, as well as by its strongly notched fruit.

Wimmeria microphylla Radlk. Bot. Centralbl. **15**:359. 1903.

Collected by J. N. Rose and Jos. H. Painter near Tehuacán, 1905 (nos. 10013, 10129) and by J. N. Rose near the same locality, 1906 (nos. 11242, 11434).

RHAMNACEAE.

SIX SPECIES OF CEANOTHUS, FOUR NEW.

Ceanothus australis Rose, sp. nov.

Shrub, 2 to 3 meters high, spineless; branches very regular, elongated, 10 to 15 cm. long; leaves opposite, 10 to 18 mm. long, much longer than the internodes, one-nerved, thick, often retuse at apex, pale green; stipular glands large and long-persistent; pedicels slender, pubescent; flowers white.

Collected by E. W. Nelson near Coixtlahuaca, Oaxaca, November 12, 1894 (no. 1914).

Type U. S. National Herbarium no. 569221.

This species belongs to the section Cerastes and is perhaps nearest *C. greggii*, but it has much longer branches and larger leaves.

Ceanothus candolleanus Rose, sp. nov.

Bush 3 to 5 meters high; young branches pubescent; leaves oblong, above glabrous or at least glabrate, beneath densely brownish-tomentose, 5-nerved, rather broad at base, obtuse, serrate, the teeth tipped by red (in age black) glands; pedicels slender, 4 to 5 mm. long, glabrous, bluish; calyx teeth acute; petals blue.

Specimens examined:

Federal District: Near Eslava, C. G. Pringle, November, 1903 (no. 11395); San Nicolas, M. Bourgeau, 1865 (no. 994).

Type U. S. National Herbarium no. 460858.

This species seems to be the *C. azureus* of DeCandolle's Prodromus[a] which came from San Angel near the two stations mentioned above. Here may also belong the

([a] **2**: 31. 1825.)

C. bicolor Humb. & Bonpl. and the *C. caerulea* of Humboldt, Bonpland, and Kunth, but their plant is described as having acute leaves and very short pedicels (1 line long).

Ceanothus goldmanii Rose, sp. nov.

Shrub 2 to 4 meters high; young branches reddish-pubescent; leaves opposite; ovate to orbicular in outline, acute or obtuse, the margin bearing a few sharp teeth, thick and coriaceous, puberulent above, pubescent beneath; pedicels glabrous; petals white.

Common in the mountains of Northern Lower California.

Specimens examined:

Lower California: La Huerta, E. A. Goldman, June 2, 1905 (no. 1126, type); San Pedro Martir Mountains, E. A. Goldman, July 5, 1905 (no. 1207); also T. S. Brandegee, May 28, 1889.

Type U. S. National Herbarium no. 565036.

This species has heretofore been passing as *C. rigidus*, but it grows in very different situations, and has very characteristic leaves with white instead of pink flowers.

Ceanothus lanuginosus (Jones) Rose.

Ceanothus greggii lanuginosus Jones, Proc. Calif. Acad. II. **5**: 629. 1895.

Mr. Jones's variety seems quite distinct from the true *C. greggii* and surely deserves specific rank.

Ceanothus parvifolius (S. Wats.) Rose.

Ceanothus azureus parvifolius S. Wats. Proc. Am. Acad. **23**: 270. 1880.

Ceanothus submontanus Rose, sp. nov.

Shrub, 1 to 3 meters high, much branched; bark of first year's branches reddish, covered with soft cinereous pubescence, the older branches light gray; leaves opposite, oblong-cuneate, pale and pubescent above, pubescent beneath, 6 to 16 mm. long, entire, rounded at apex; pedicels slender, glabrous, and somewhat glutinose in age; capsule globular, 5 mm. in diameter, bearing three prominent projections above the middle.

Collected by E. A. Goldman near Alamo, Lower California, July 11, 1905 (no. 1140, type) and at Piñon on northwest slope of San Pedro Martir Mountains, July 5, 1905 (no. 1209).

The type is U. S. National Herbarium no. 365049.

This species belongs to the section Cerastes and is nearest *C. cuneatus*, but differs from the typical specimens of that species in the nature and color of the pubescence, in having the leaves paler above and not so white beneath, and in its more globular fruit.

VITACEAE.

A NEW CISSUS.

Cissus subtruncata Rose, sp. nov.

Stems creeping or climbing; softly pubescent; leaves broadly ovate, rounded-truncate or slightly cordate at base, obtuse, acute or slightly acuminate, densely lanate-pubescent beneath especially when young, more or less pubescent above; inflorescence compound, subumbellate, pubescent; pedicels slender, pubescent, nodding in fruit; calyx cup-shaped, pubescent; sepals rounded, scarious-margined; pedicels glabrous, 2 mm. long; ovary glabrous; style glabrous, 1 to 1.5 mm. long.

Collected by J. N. Rose near Oaxaca City, June, 1899 (no. 4614).

Type U. S. National Herbarium no. 346595.

This species differs in several respects from true *C. sicyoides*, especially in its hairy pedicels and very pubescent young leaves.

TILIACEAE.

FOUR NEW SPECIES OF TRIUMFETTA.

The genus Triumfetta has long been in need of revision, and some years ago I hoped to present a preliminary treatment of the Mexican species, but I have not been able to finish it. While trying to arrange the Mexican material in the National Herbarium I discovered the following new species:

Triumfetta falcifera Rose, sp. nov.

Low, bushy shrubs, 90 to 150 cm. high; branches densely pilose; leaves lanceolate, long-acuminate, rounded at base, 7 to 10 cm. long, with scattered simple and stellate hairs above, densely and softly stellate beneath; flowers in small axillary clusters or in narrow more or less elongated panicles; sepals densely pubescent, about 6 mm. long, the appendages 4 mm. long, often 2-parted, sometimes 3-toothed; petals yellow; stamens indefinite; fruit orbicular, covered with stout short prickles, nearly glabrous, 4-celled.

Collected by Dr. E. Palmer near Acapulco in 1894–95 (nos. 63 & 266).

Type U. S. National Herbarium no. 266324.

Triumfetta dehiscens Rose, sp. nov.

Stems shrubby; young branches with dense reddish stellate pubescence; upper leaves short-petioled, lanceolate, acuminate, very irregularly serrate, the lower teeth glandular, the young ones very pale beneath, densely soft-stellate, greener and less stellate above; fruit orbicular, covered with short glabrous prickles, 5-celled, dehiscing when mature.

Collected by J. N. Rose near Colomas, July 16, 1897 (no. 1698).

Type U. S. National Herbarium no. 300559.

Very different from most species of the genus, which have indehiscent fruit.

Triumfetta discolor Rose, sp. nov.

Plants growing in clumps, 60 to 90 cm. high; branches pubescent with fine hairs interspersed with coarse stellate or simple pilose ones; leaves with petioles about the length of the blade, the blade nearly orbicular in outline and obtuse, rarely ovate and acutish, 2 to 7 cm. in diameter, greenish above with rough scattered stellate hairs, white beneath with a dense stellate tomentum; inflorescence terminal in a mostly naked narrow panicle; sepals 4 or 5, brownish, somewhat stellate, the appendage slender (2 to 3 mm. long); petals bright yellow, about the length of the sepals, hairy at base; stamens about 20; fruit not seen.

Collected by J. N. Rose between Pedro Paulo and San Blascito, Territorio de Tepic, August 4, 1897 (no. 1979 type), and on the east slope of the west range and the west slope of the east range of the Sierra Madre in the State of Durango, August 13 and 15 (nos. 2255 and 3305).

Type U. S. National Herbarium no. 300870.

A very beautiful species which does not approach any other described from Mexico. *T. socorrensis* has somewhat smaller but thicker leaves.

Triumfetta goldmanii Rose, sp. nov.

Branches at first covered with small stellate hairs but soon becoming glabrate; leaves lanceolate, rounded at base, acuminate, green but with scattered simple, appressed hairs above, paler and somewhat more pubescent (hairs also simple) beneath, crenately toothed, 5 to 7 cm. long; petioles short (in specimens seen), 1 cm. long; flowers usually in umbels of 2 or 3; peduncles 1 to 3 in the upper axils, 3 to 4 mm. long; pedicels 4 to 10 mm. long; calyx 15 to 16 mm. long, covered with small stellate hairs without and bearing a small erect appendage just below the tip; petals yellow; anthers reddish; ovary and fruit sessile; fruit glabrous but covered with stout bristles, somewhat rugose, globose, 5 mm. in diameter.

Collected by E. A. Goldman on the Sierra de Choix, 50 miles northeast of the town of Choix, State of Sinaloa, October 17, 1898 (no. 264).

Type U. S. National Herbarium no. 335763.

MALVACEAE.

MISCELLANEOUS SPECIES.

Gaya violacea Rose, sp. nov.

A slender erect shrub up to 2 meters high, the branches clothed with short soft pubescence together with long spreading hairs; petioles 4 to 6 cm. long; blade ovate, acuminate, coarsely crenate, cordate at base, the sinus either narrow or closed, becoming glabrate above, finely stellate-pubescent beneath; peduncles slender, a little shorter than the petioles, pilose as well as stellate-pubescent; calyx lobes ovate, acute; petals violet; carpels 9, each one-seeded.

Collected by C. G. Pringle under dry cliffs on the Sierra Madre above Monterey, 1906 (no. 10221).

Type in U. S. National Herbarium no. 462260.

This species is not very near any of the known Mexican species of Gaya, differing from them all in its violet or purplish flowers.

Malvastrum[a] **bicuspidatum** (S. Wats.) Rose.

Malvastrum tricuspidatum bicuspidatum S. Wats. Proc. Am. Acad. **21**: 417. 1886.

In 1885 Dr. S. Watson briefly described his variety *bicuspidatum* of *Malvastrum tricuspidatum*, which Mr. E. G. Baker later referred to *Malvastrum scabrum*, to which it is much more closely related. In the National Herbarium we have considerable material labeled *M. scabrum* besides the Wilkes specimen from Peru, which appears to be true *M. scabrum*. A careful study of the Mexican species convinces me that the supposed variety deserves specific rank. It differs from *M. scabrum* in its smaller leaves, these never cordate but cuneate at base, the flowers always solitary, the peduncles shorter, the sepals more acuminate, the carpels also slightly different.

The following specimens have recently been collected:

Morelos: Near Cuernavaca, Rose & Painter, September, 1905 (no. 10246).

Guanajuato: Leon, Rose & Lozano, September, 1906.

Wissadula microcalyx Rose, sp. nov.

Stems herbaceous, 1 to 2 meters high, much branched, clothed with yellow glandular spreading hairs; leaves broadly ovate, sometimes 3-lobed, the lower ones 15 cm. long, acuminate, crenately toothed, cordate at base, stellate-pubescent beneath; inflorescence paniculate; calyx small, the lobes broadly ovate; corolla deep yellow, 3 cm. in diameter; carpels obtuse, 3-seeded.

Collected by J. N. Rose on the mountains west of Tehuacán, September 12, 1906 (no. 11418).

Type U. S. National Herbarium no. 454200.

LOASACEAE.

TWO NEW SPECIES OF EUCNIDE.

Eucnida nelsonii Rose, sp. nov.

Pubescence on stems soft and spreading; leaves all petiolate, nearly orbicular, 5 to 60 mm. long, with rough pubescence on both surfaces, irregularly lobed and toothed; pedicels 2 mm. or less long; calyx lobes linear-oblong, 1 cm. long; pétals erect, 2.5 mm. long; stamens numerous, longer than the petals.

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[a] Malvaeopsis C. Presl has priority over Malvastrum and accordingly has been substituted for it by some writers. It is not at all clear to my mind that these two names belong to the same genus and I therefore propose provisionally to retain Malvastrum. The Vienna Congress has also retained this name, but for a different reason.

Collected by E. W. Nelson at La Salada, Michoacan, March 15 to 22, 1903 (no. 6926).
Type U. S. National Herbarium no. 399295.

Perhaps nearest *E. cordata*, but with softer pubescence, less lobed leaves, and nearly glabrous petals.

Eucnida pringlei Rose, sp. nov.

A rather coarse climbing plant; pubescence on stems and branches soft and spreading; leaves long-petioled, the upper ones often 7 cm. long, broadly ovate, 8 to 15 cm. long, rounded at apex, more or less cordate at base; pedicels 2 to 3 cm. long; calyx 15 to 17 mm. long; petals erect, 3.2 to 3.8 cm. long; stamens numerous, 5 cm. long.

Collected by C. G. Pringle on limestone cliffs in the Iguala Cañon, altitude 750 meters, September 22, 1905 (no. 10077).
Type U. S. National Herbarium no. 462126.

LYTHRACEAE.

SIX NEW SPECIES OF CUPHEA.

It is with considerable reluctance that I continue to use the name Cuphea instead of Parsonsia, but Prof. E. Koehne, who has for so many years given attention to the genus, still thinks that Cuphea had better be retained, and for the present I have accepted his advice; but I still believe that Parsonsia should be used. Until Prof. Koehne or some one else can revise and transfer all the species these may as well wait in Cuphea.

Cuphea goldmanii Rose, sp. nov.

FIGURE 28.

Shrub 1 to 2 meters high; old branches brownish, with very short pubescence; young branches with soft white hairs and stiff purple ones, as also with sessile glands; leaves lanceolate, shortly acuminate, rounded at base, short-petioled, pale and pubescent beneath, dark and with coarse pubescence above, almost scabrous; flowers axillary; calyx 18 to 20 mm. long, pubescent, spurred at base, the teeth all large, the upper ones much larger; petals 6, all of the same color, dark red, distinctly clawed, the two upper a little larger; stamens 11, the longer ones exserted; gland large, reflexed; style slender, glabrous; seeds 35 to 40.

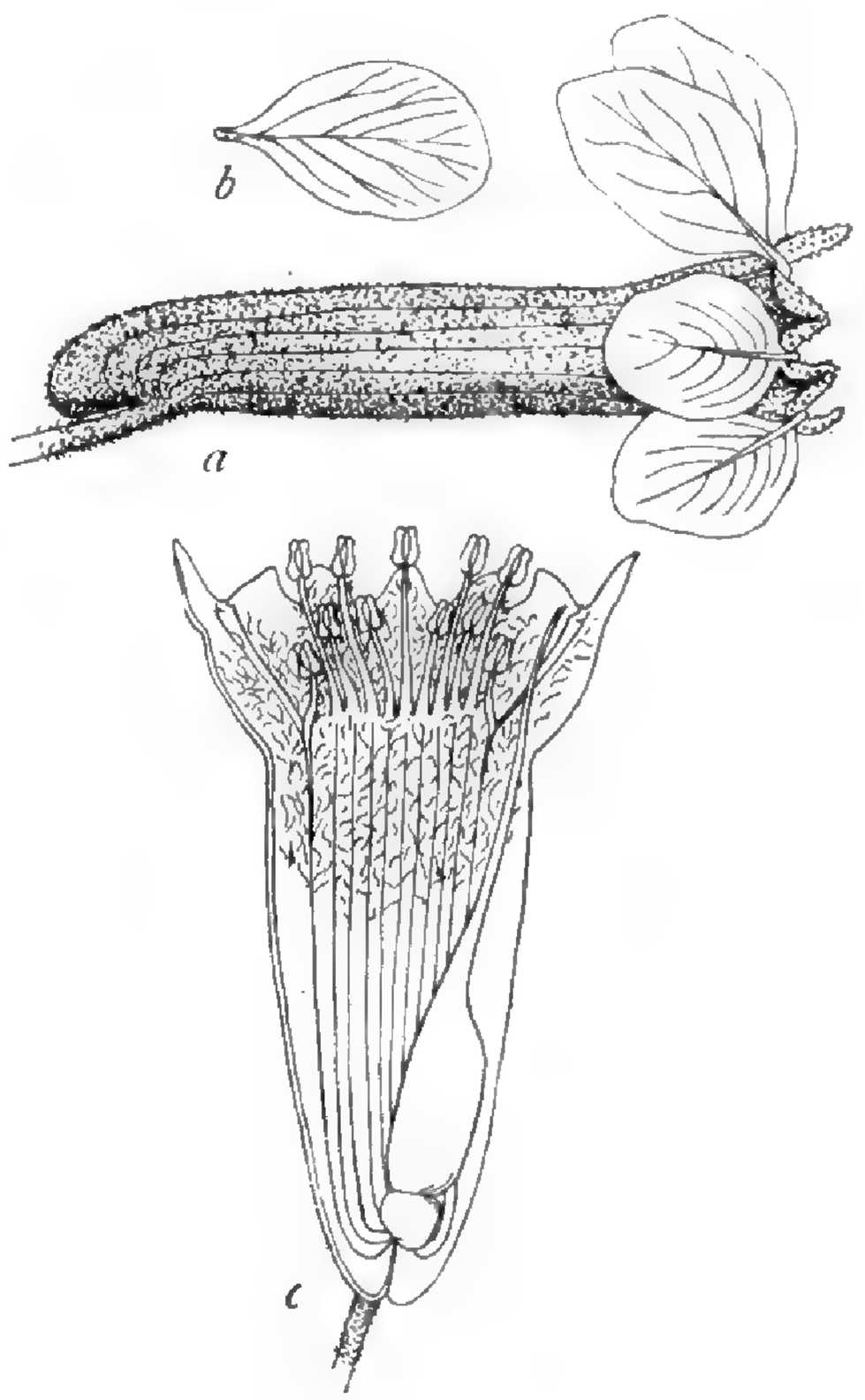


FIG. 28.—Flower and petal of *Cuphea goldmanii*. *a*, Natural state; *b*, petal; *c*, without petals, opened. Scale 2.

Collected by E. A. Goldman at Comitan, Chiapas, April 3, 1904 (no. 824).
Type U. S. National Herbarium no. 470627.

Perhaps nearest *Cuphea llavea*, but very different.

Cuphea imberbis Rose, Engl. Bot. Jahrb. **41**: 94. 1907. FIGURE 29.

Probably an annual, 30 to 40 cm. high; purplish at the nodes, with very short close pubescence; leaves thin, somewhat lanceolate, tapering toward the apex, cuneate at base, short-petioled, with roughish pubescence on both surfaces; flowers axillary, solitary; peduncle 10 to 12 mm. long, bibracteolate at top; calyx tube elongated, 2 cm. long, with close pubescence and a few long stiff hairs, the upper sepal much longer, the appendages alternate, the calyx tube longer than the lobes; two dorsal petals violet purple, 10 to 12 mm. long, tapering at base into a slender claw, subtended at base by a large squama; 4 ventral petals erect, small, 2 mm. long, white; stamens 9, all glabrous, 5 exserted; disk one-sided, reflexed; capsule 12-seeded.

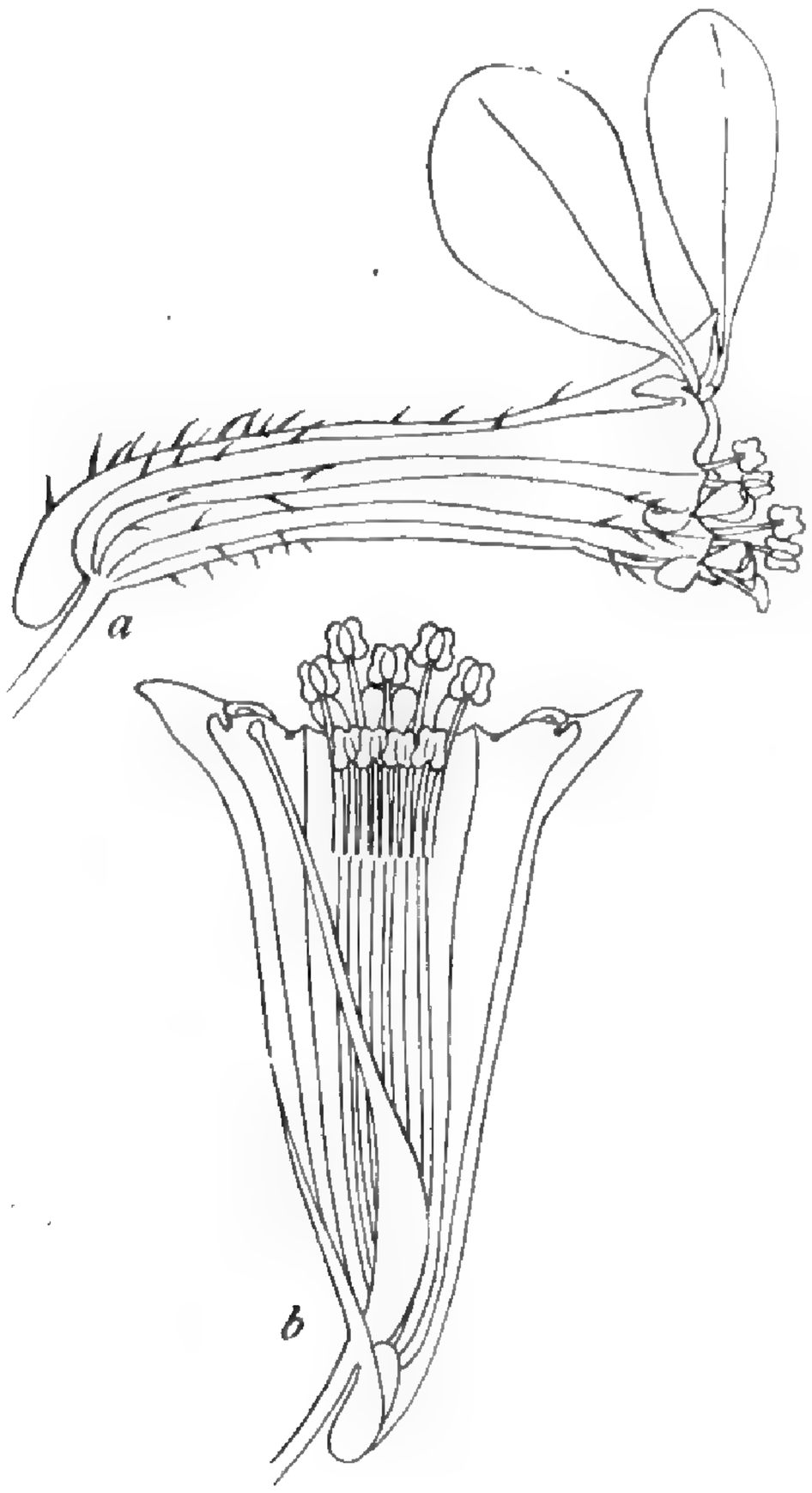


FIG. 29.—Flower of *Cuphea imberbis*. *a*, Natural state; *b*, without petals, opened. Scale 2.

Collected by C. G. Pringle near Trinidad, Puebla, 1906 (no. 8979).

This species is to be placed near *C. palmeri*.

Cuphea lozanii Rose, Engl. Bot. Jahrb. **41**: 91. 1907. FIGURE 30.

Annual, either simple or somewhat branched, 20 to 30 cm. high, with pubescence of two kinds, one of short white retrorse hairs, the other of the long spreading red or yellow hairs; leaves narrowly lanceolate, or the upper ones linear, 1.5 to 3 cm. long, subsessile, acute; peduncles short; prophylla black, small, deeply parted, appearing as a fringed involucre; calyx 12 to 14 mm. long, purple on one side, with short, scabrous pubescence and a few long scattered hairs; upper lobe much broader than the others; spur rather short; petals 6, large, nearly equal, deep purple; two longer stamens covered with dense purple wool; seeds 4 to 6.

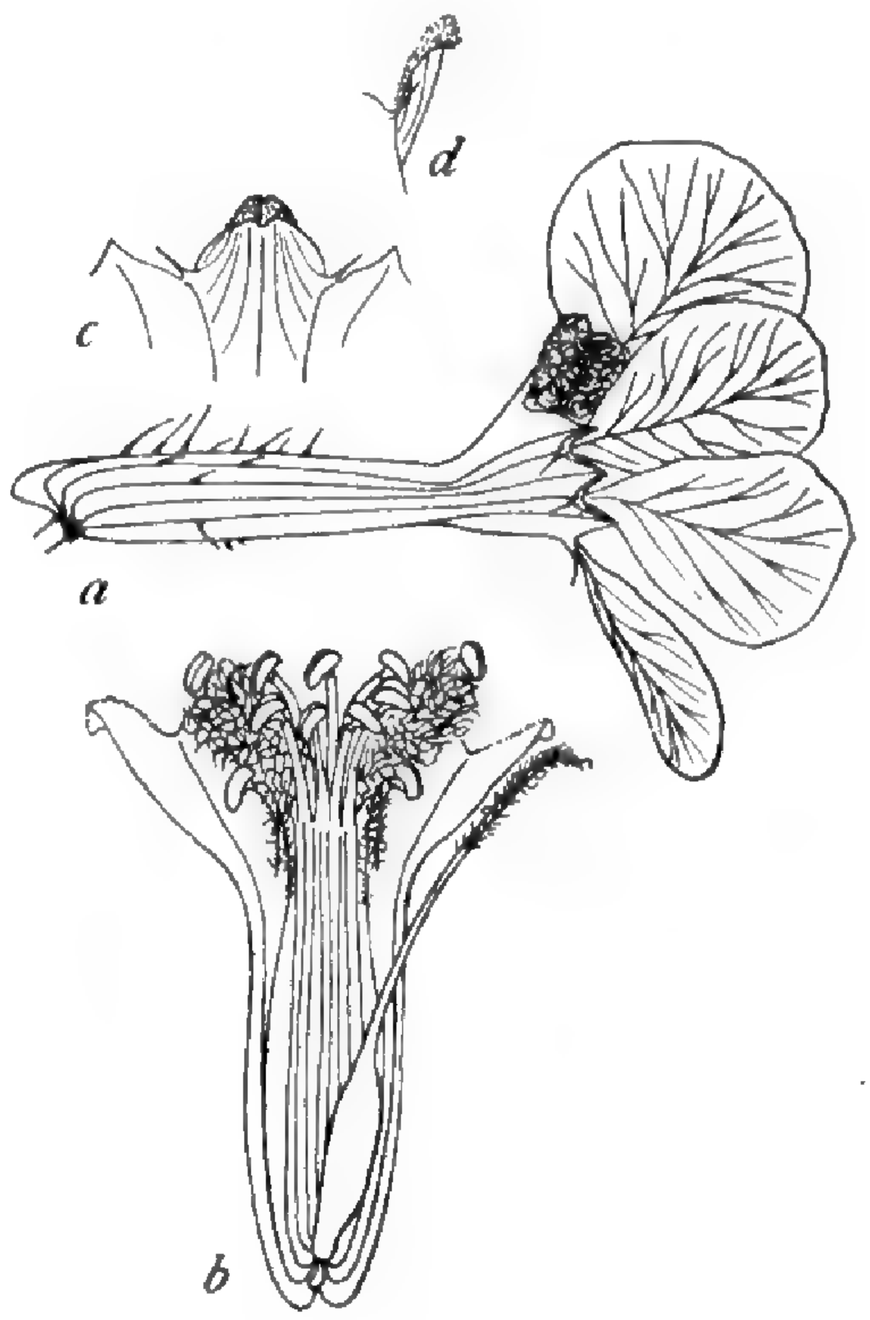


FIG. 30.—Flower and sepal of *Cuphea lozanii*. *a*, Natural state; *b*, without petals, opened; *c*, front view of upper sepal; *d*, side view of same. Scale 2.

Collected by C. G. Pringle and Filemón Lozano at Etzatlan, Jalisco, 1904 (no. 8858).

This species is nearest *C. lophostoma*, but with different pubescence, foliage, prophylla, etc.

Cuphea lutea Rose, Engl. Bot. Jahrb. **41**: 87. 1907.

Annual; stems (and foliage) yellowish green, slender, much branched, clothed with long spreading purplish hairs and a fine short pubescence arranged in lines; leaves petioled, lanceolate, obtuse, pubescent with long scattered hairs and short hispid hairs; calyx short-pediceled, 7 to 8 mm. long, usually with none but the long spreading hairs, yellow green to purplish brown; dorsal sepal much longer; two dorsal petals 6 to 7 mm. long, purplish; 4 ventral petals yellow, narrow, 2 mm. long.

Specimens examined:

Oaxaca: Valley of Oaxaca, Nelson, September 20, 1894 (no. 1457a); Pringle same year and locality (no. 5725); Cuicatlan, Nelson, 1894 (no. 1689), type; Telixtlahuaca, Lucius C. Smith, 1895 (no. 536).

This species resembles *C. tolucana*, but is more branched, has the ventral petals yellow, etc.

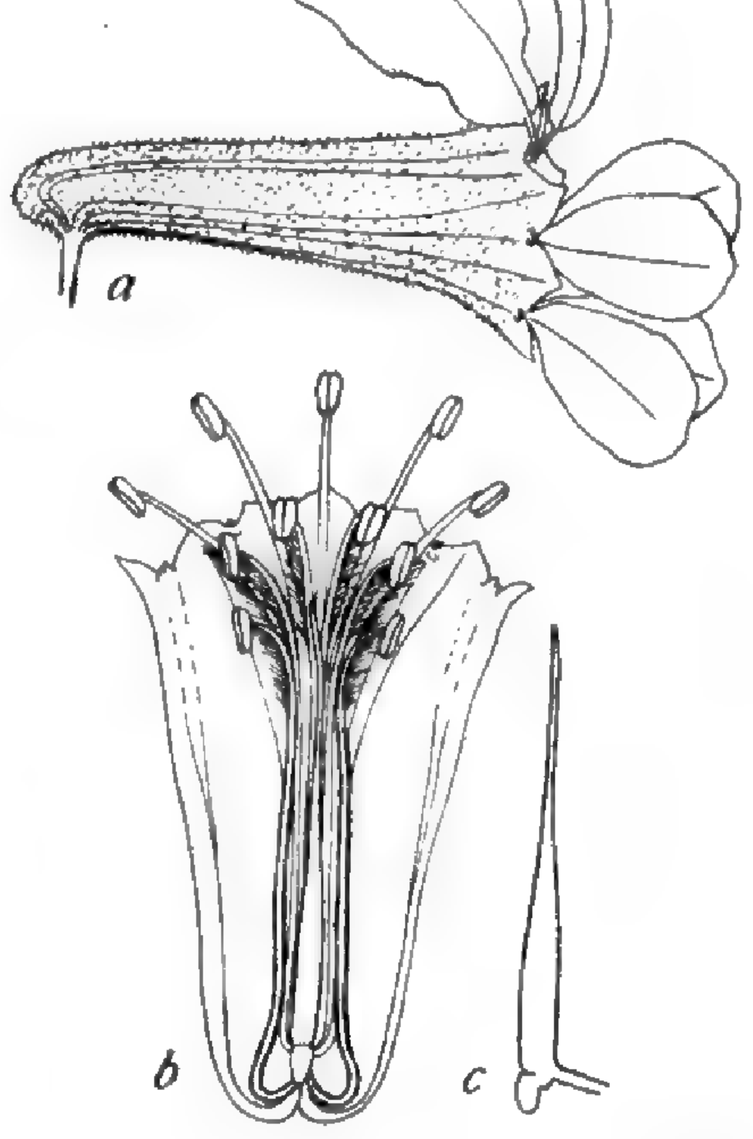


FIG. 31.—Flower and ovary of *Cuphea painteri*. *a*, Natural state; *b*, without petals, opened; *c*, ovary with basal gland. Scale 2.

Cuphea painteri Rose, Engl. Bot. Jahrb. **41**: 91. 1907. FIGURE 31.

Perennial, somewhat frutescent at base, 30 to 50 cm. tall, somewhat branching; the old stems shreddy at base, above bearing stiff reflexed hairs with scattered spreading longer ones and in the inflorescence somewhat viscid; leaves lanceolate, 4 to 6 cm. long, acute, cuneate at base, roughened on both sides, borne on short slender petioles; inflorescence a narrow panicle, 5 to 20 cm. long; bracts linear; pedicels slender; corolla lilac-colored, setose, 14 mm. long, glabrous within and with two longitudinal wings; spur pronounced, rounded; petals deep lilac, the 2 dorsal nearly orbicular, 6 mm. long including the short claw; the 4 ventral ones orbicular, sessile, half as long as the dorsal ones; stamens 11; style and capsule glabrous; gland reflexed; seeds about 20.

Collected at Etzatlan, Jalisco, Mexico, by J. N. Rose and Jos. H. Painter, October 2, 1903 (no. 7532), and at the same locality later by C. G. Pringle (no. 8770).

This species in habit and foliage resembles *C. hookeriana*, but is quite different in the color of the calyx, petals, etc. I found this species on the same mountain as the latter, but not at as great an elevation.

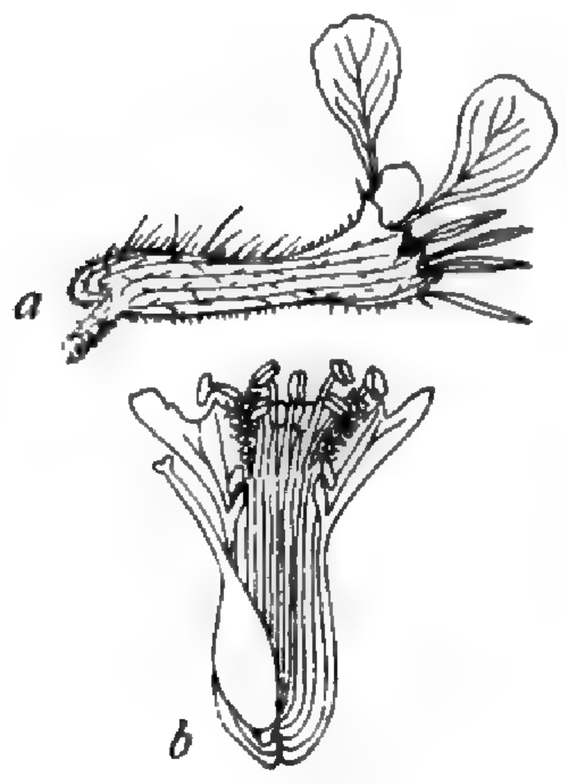


FIG. 32.—Flower of *Cuphea viscosa*. *a*, Natural state; *b*, without petals, opened. Scale 2.

Cuphea viscosa Rose, Engl. Bot. Jahrb. **41**: 89. 1907. FIGURE 32.

Annual; stems branching; branches slender, terminating in long slender erect racemes, clothed with short clammy pubescence; leaves lanceolate, cuneate at base, slender-petioled, the margin and petiole glandular-ciliate, the two surfaces glabrate; pedicels 5 to 6 mm. long, glandular-pubescent; calyx 8 mm. long, slender, hirsute with purplish hairs below, these especially noticeable in unopened flowers, much enlarged and nearly glabrous above; dorsal lobe enlarged; petals 6, the 2 dorsal ones purplish, oblong, obtuse, 6 mm. long, including the slender claw, the 4 ventral linear, 3 mm.

long, only seen in unopened buds; stamens 11; dorsal stamens glabrous above, woolly below; ovary and style glabrous; ovules and seeds 3.

This species belongs to the section Heterodon.

Collected by C. G. Pringle, from holes in limestone ledges of mountains above Iguala, Guerrero, altitude 1,050 meters, October 3, 1900 (no. 8392).

CACTACEAE.

MISCELLANEOUS NEW SPECIES.

Cactus maxonii Rose, Smithson. Misc. Coll. **50:** 63. 1907.

Melocactus guatemalensis Gürke & Eichlam, Monatsschr. Kakteenk. **18:** 37. 1908.

Melocactus maxonii Gürke, Monatsschr. Kakteenk. **18:** 93. 1908.

Plant body simple, deep green, broadly cone-shaped or short-cylindrical, 10 to 15 cm. high; cephalium rather small, consisting of a mass of white wool and brown bristles; ribs 11 to 15, rather broad, either mottled or plain; spines generally 9, rarely only 8, sometimes with several smaller ones, making 11 in all, the central 1 (rarely 2) short, standing nearly at right angles to the rib, 1.5 to 2 cm. long; radial spines spreading or even recurved, pale red or rose-colored with a whitish bloom, but when old colored amber; flowers small, rose-colored; fruit narrowly oblong or club-shaped, red, resembling that of Mamillaria; seeds black, shining.

Collected in Guatemala near El Rancho by W. R. Maxon in 1905 (no. 3766) and near Salama, January 22, 1905 (no. 3378); also collected in Guatemala by Prof. W. A. Kellerman. Both collectors sent living plants to Washington, and this description is drawn up from this material.

Perhaps nearest *C. neryi* but with more numerous ribs, with a smaller cephalium, and with the spines almost always 9.

Echinocactus megarrhizus Rose, sp. nov.

Roots large and fleshy, either solitary or in clusters of three or four; plant body nearly globular or a little elongated, 5 to 8 cm. high, usually solitary; ribs divided into spirally disposed mammæ; mammæ dark green, 4 to 5 mm. high; radial spines 20 or more, pectinate, at first pale yellow, in age white; in seedlings the spines all pubescent; centrals usually 4, the 3 upper similar to although a little larger than the radial, in young areoles not easily distinguished from them, the lower radial stout and strongly hooked, 15 mm. long; flowers not seen; fruit green, suggesting that of a Mamillaria, clavate, bearing a few naked scales near the top; seeds black, smooth, shining.

Collected by Dr. E. Palmer near Victoria, Mexico (no. 107, 1907).

Type U. S. National Herbarium no. 572337.

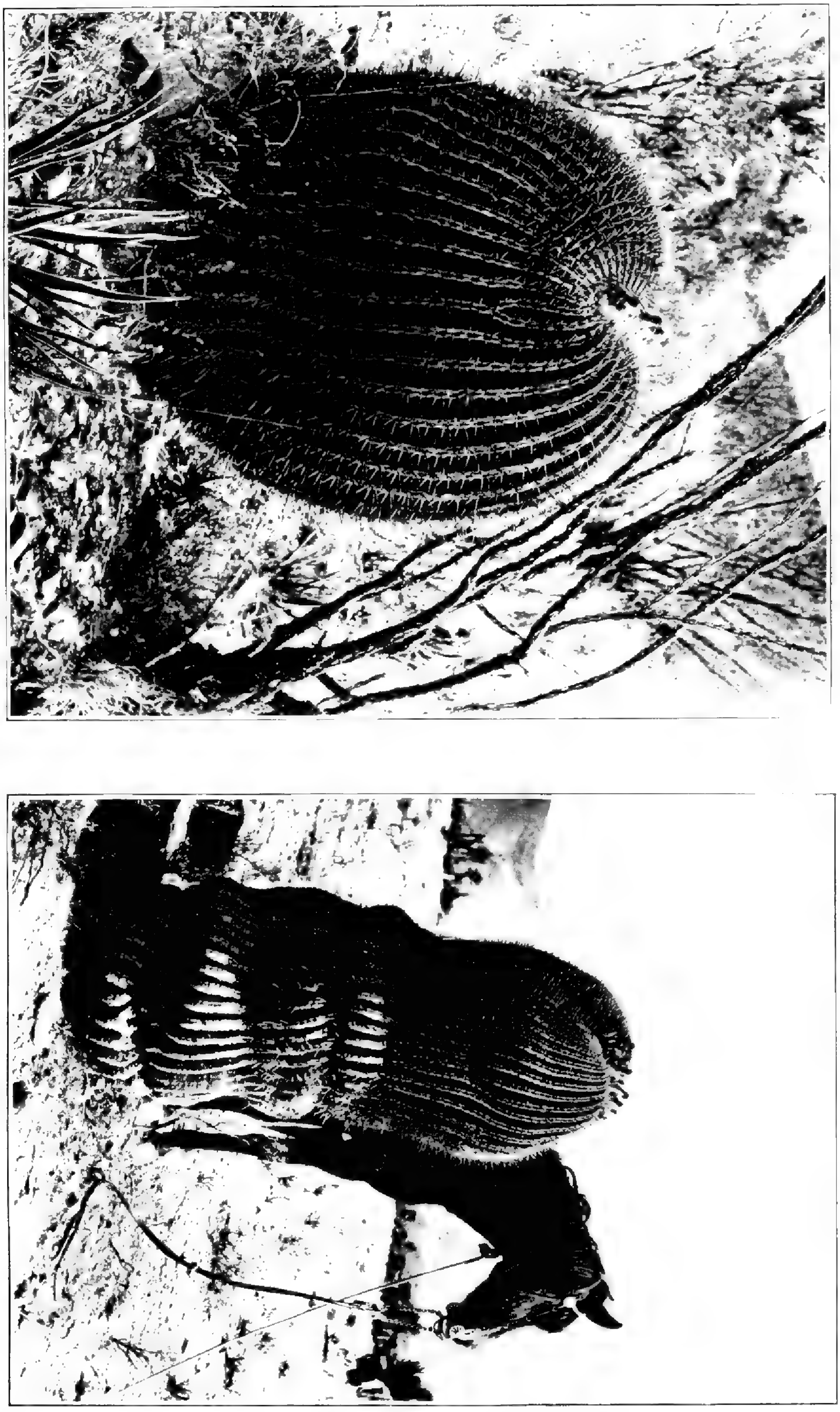
This species is near *E. brevihamatus* and *E. scheeri*, but has differently colored spines, and differs in technical details.

Echinocactus palmeri Rose, sp. nov. PLATE XXIII

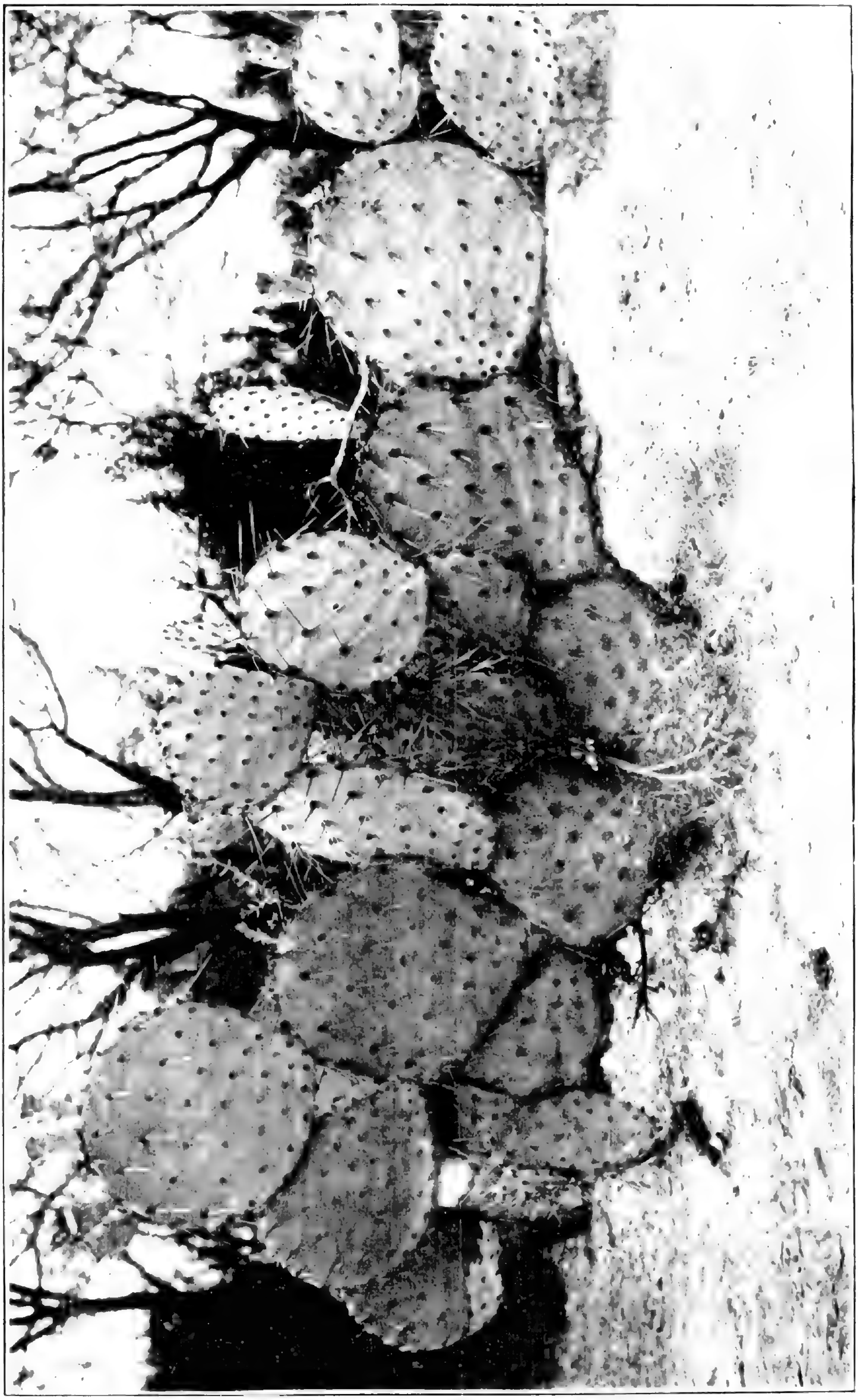
Stems 100 to 150 cm. or more high, 40 to 50 cm. in diameter; ribs 12, 20, 26, or perhaps more in large plants; central spines 4, annular, the upper one erect, 6 to 8 cm. long, stout, straight, yellow above, brownish and somewhat swollen at base, the 3 lower shorter, spreading, similar in color and markings but flattened; radials 5 to 8, much smaller, lighter-colored and weaker; flowers rather small, yellow, about 2 cm. long; sepals and petals more or less lacerated along the margin; fruit about 3 cm. long, hidden in a dense covering of soft white wool; bracts weak and bristle-tipped.

This is the well-known *Echinocactus saltillensis* of horticultural collections, but is not the species first described under that name.

Not uncommon from southern Coahuila to Zacatecas.



ECHINOCACTUS PALMERI ROSE.



OPUNTIA AZUREA ROSE.

Specimens examined:

*Z*acatecas: Concepción del Rio, Dr. E. Palmer, August 11 to 14, 1904 (no. 324, type); same State, F. E. Lloyd, 1908 (no. 12).

Type U. S. National Herbarium no. 471193.

Dr. E. Palmer calls this the "barrel cactus," and states that it is cooked in syrup and made into candy. F. E. Lloyd writes of it as follows: "Biznaga burra. The most striking cactus of this region, where it is found on the higher foothill slopes and in the hills on the slopes facing the south, with only very few exceptions. Growing point depressed, elongate-ovate, except in very young plants, in which it is round, as in cacti in general; marked by a dense felt of wool of light brown color. Two meters in height. Spines brown in young, yellow in old plants. Ridges furrowed in older plants. Flowers entirely lemon-yellow, as well as the fruit, which is dry, hollow, with persistent perianth."

Echinocactus victoriensis Rose, sp. nov.

Plants never cespitose; plant body globular or somewhat depressed; 10 to 30 cm. in diameter, of a bright glossy green color; ribs usually 11, rather thin, 2 to 3 cm. deep, acute, 4 to 6 cm. apart at widest point; areoles few, 3 to 4 cm. apart, rather small; spines all bright yellow; radials 7 or 8, only slightly spreading from the central; central 1, a little longer and stouter than the others, 3 to 4 cm. long; flowering part of areole filled with short brownish wool but hardly forming enough to give a cap to plant; petals yellow, about 3 cm. long; ovary about 2 cm. long, the small broadly ovate bracts naked in the angles; seeds brownish black, shining, about 2 mm. in diameter.

Not very common in rocky places above Victoria, Mexico.

Collected by Dr. E. Palmer, April 9, 1907 (no. 267); living specimens sent to Washington, no. 07. 206.

Type U. S. National Herbarium no. 572498.

Individual specimens of this species much resemble *E. robustus*, but the material in general presents a type different in habit, spines, and flowers. Called "visnaga."

Opuntia azurea Rose, sp. nov. PLATE XXIV. FIGURE 33.

A compact upright plant with a single trunk, 1 to 2 meters high; joints orbicular to obovate, 10 to 15 cm. in diameter, pale bluish green, glaucous; areoles about 2 cm. apart, bearing numerous brown glochides, the lower ones without spines, the upper ones with 1 to 3 more or less reflexed spines; spines almost black, at least when old, unequal, the longer ones 2 to 3 cm. long; petals deep yellow, 3 cm. long, with crimson claw, but in age pink throughout; filaments greenish or almost white; anthers pale yellow; stigmas pale green; fruit dull crimson, subglobose to ovate, truncate, spineless, the pulp light green, juicy and edible.

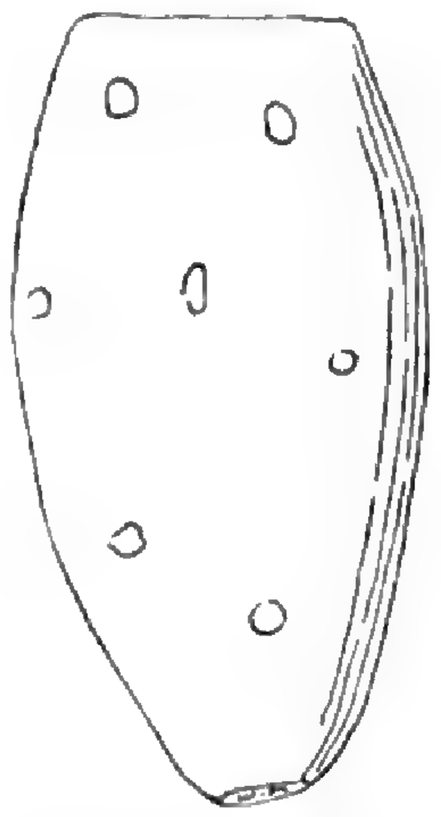


FIG. 33.—Fruit of *Opuntia azurea*. Natural size.

Collected by F. E. Lloyd, in northeastern Zacatecas, 1908 (no. 30).

Type U. S. National Herbarium no. 535132.

Called in Mexico "nopalito" and "nopal coyotillo." Perhaps near *O. phaeacantha*, but surely very distinct.

EXPLANATION OF PLATE XXIV.—From photograph taken by F. E. Lloyd in northern Zacatecas.

Opuntia chihuahuensis Rose, sp. nov.

Low spreading plants; old joints yellowish-green, obovate, 10 to 15 cm. long; areoles rather few, distant, 2 to 4 cm. apart; lower areoles spineless, the upper ones bearing 1, 2, or 3 normal spines, these brownish, porrect, 4 to 6 cm. long, terete or a little flattened, often with 1 or 2 shorter whitish ones added; joints, when very young,

shiny, brownish, the areoles bearing at first a single brown spine and small brownish, terete, acute leaves; petals obovate, 3 cm. long, obtuse, yellow with reddish bases (when dry); ovary spineless but the few areoles crowded with brownish bristles.

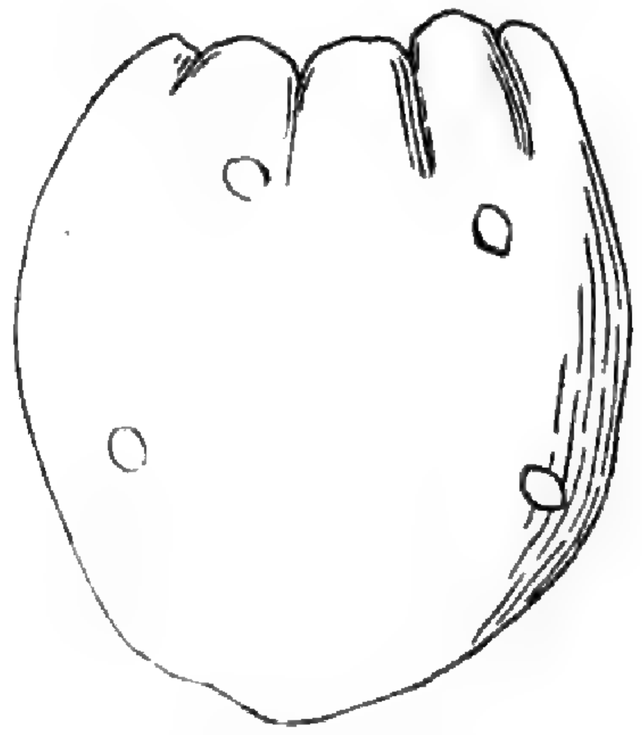


FIG. 34.—Fruit of *Opuntia lloydii*. Natural size.

Described in part in the field from living plants in April, 1908, and in part from herbarium specimens collected from the same colony at flowering time by Dr. E. Palmer.

Specimens examined:

Chihuahua: Santa Eulalia near Chihuahua City, J. N. Rose, April, 1908 (no. 11675); same locality, Dr. E. Palmer, 1908 (no. 69, type).

Type U. S. National Herbarium no. 573546.

This species is nearest *O. phaeacantha*, from which it differs in its larger, broader joints and lighter-colored spines and in its distribution, which is considerably south of the range of that species.

Opuntia lloydii Rose, sp. nov.

PLATE XXV. FIGURE 34.

A much branched shrub, 2 to 3 meters high; joints when young green, becoming glaucous, terete, the ultimate at maturity 1.2 to 1.7 cm. in diameter; tubercles prominent, oblong; spines few on last year's joints, near the base none, in the upper areoles 3, reddish, 1.1 cm. long; lateral spines usually minute (0.6 mm. long); antepenultimate joints with a fourth spine, medially placed, 1 cm. long, sheathed; leaves terete, 6 to 8 mm. long; flowers 3 cm. long (opening midday to mid-afternoon; petals 13 mm. long, 12 to 14 mm. broad, dull purple; style rose-color; fruit at first strongly tubercled, the tubercles with one to several minute spines (1 cm. long); fruit 2 to 2.25 cm. broad, greenish and yellowish, irregularly colored, slightly and irregularly tuberculate; seeds 3 mm. wide, 1.6 mm. thick.

Collected by F. E. Lloyd on footslopes, Zacatecas (no. 26).

Type U. S. National Herbarium no. 535128.

EXPLANATION OF PLATE XXV.—From photograph taken by F. E. Lloyd in northern Zacatecas.

Opuntia pyriformis Rose sp. nov.

PLATE XXVI. FIGURE 35.

Widely spreading, sometimes 7 to 10 meters broad, the lower branches almost resting on the ground, 3 to 5 meters high; joints pyriform, thick, 18 cm. long, perhaps often larger; areoles closely set (12 mm. apart), small, circular; spines 1 or 2, on old joints more, usually reflexed, slender, weak, yellow, 10 to 22 mm. long; flowers yellow; fruit 4 cm. long, somewhat tubercled, spineless, the large areoles crowded with brown hairs forming hemispherical cushions, spineless.

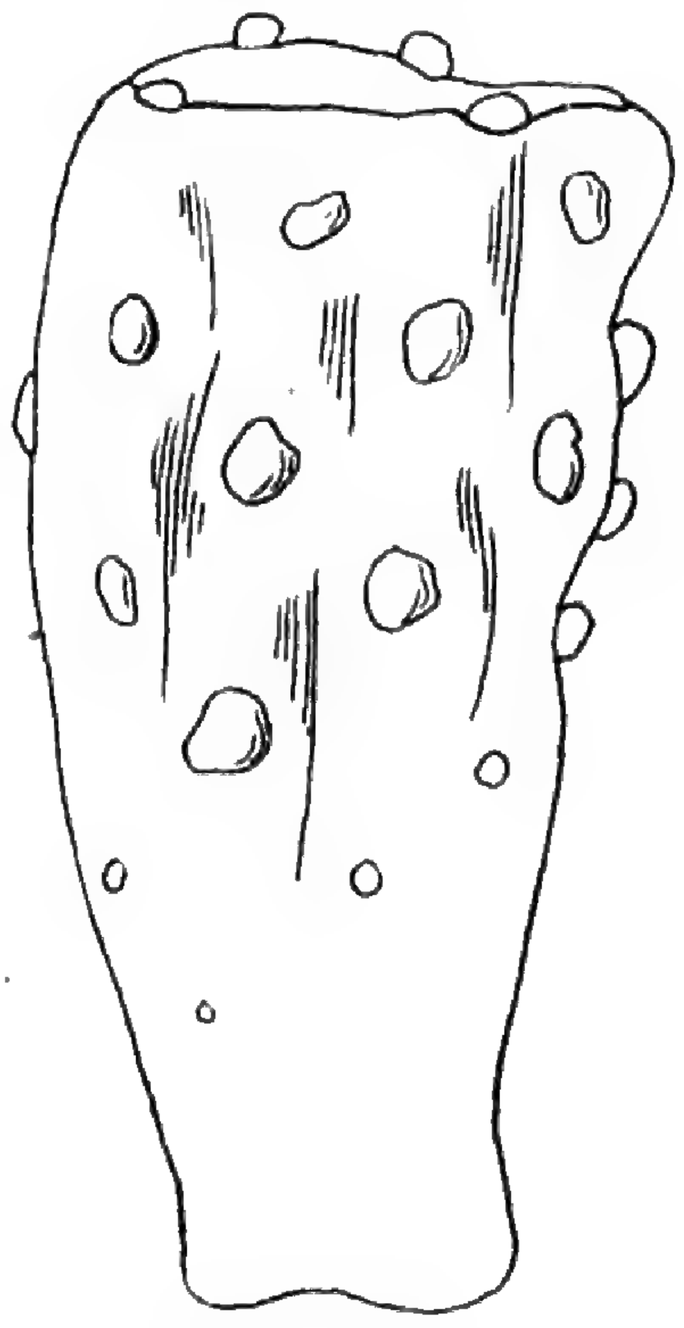


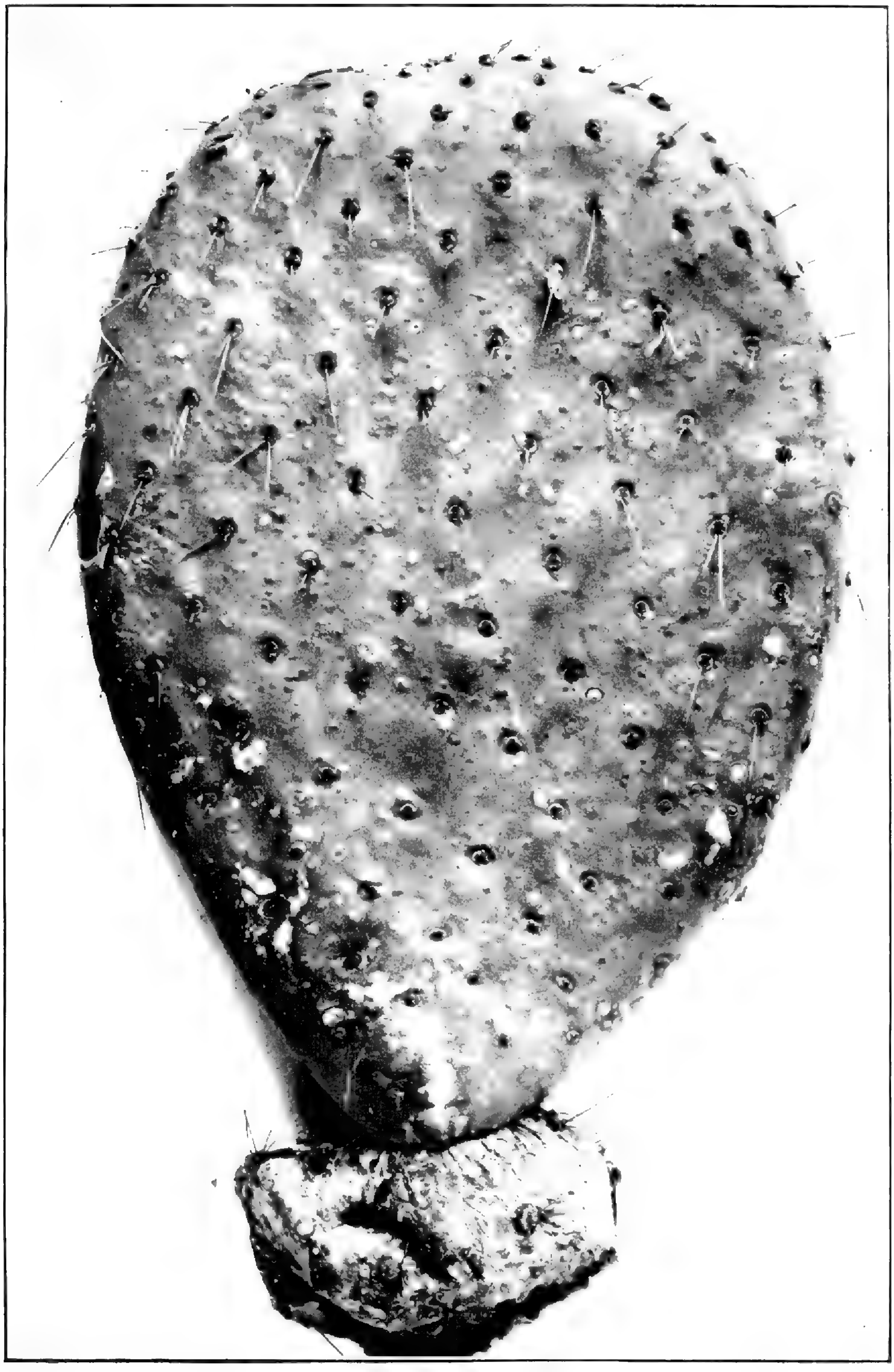
FIG. 35.—Fruit of *Opuntia pyriformis*. Natural size.

Collected by F. E. Lloyd chiefly in arroyos, northeast slopes of Pico de Teira (Pico Etereo), Hacienda de Cedros, Zacatecas, August 30, 1908 (no. 62).

Type U. S. National Herbarium no. 535200.

EXPLANATION OF PLATE XXVI.—Joint with attachment. From photograph taken by F. E. Lloyd in northern Zacatecas. Scale 7/10.

OPUNTIA LLOYDII ROSE.



OPUNTIA PYRIFORMIS ROSE.

OPUNTIA VILIS ROSE.

Opuntia vilis Rose, sp. nov. PLATE XXVII. FIGURE 36.

Low creeping plants often forming mats several meters in diameter and only 10 to 15 cm. high; joints prostrate, then erect or ascending, the ultimate vertical joints clavate, 5 cm. long, the others 2 to 4 cm. long, very turgid, pale green with low tubercles; leaves terete, 2 to 3 mm. long, acute, red; young areoles with white wool; radial spines upward of 12, the number increasing with age by the addition of very small whitish ones; central spines of prostrate joints 4, reddish, white-tipped, 1 to 4 cm. long, terete, slightly scabrous, with a sheath 5 mm. long; of clavate joints, white, reddish on the upper surface at the base, and along the whole of the lower surface, flattened; flowers 4 cm. long; petals brilliant-purplish, 2 cm. long; filaments bright yellow with green bases; style white; stigmas yellow; fruit pale green, blackening in drying, 2.5 to 2 cm. in diameter, 2.5 to 3 cm. long, tuberculate, especially about the margin of the scission; disc crenate and upper portions of the fruit correspondingly fluted; fruit spiny, somewhat dry, with large white seeds.

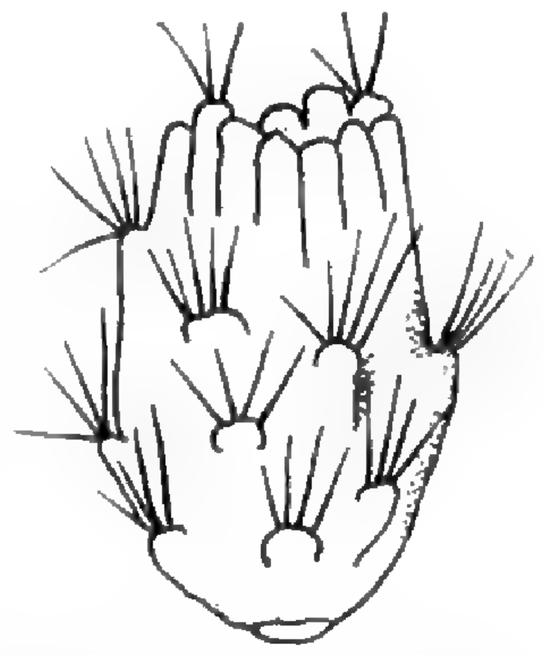


FIG. 36.—Fruit of *Opuntia vilis*. Natural size.

Collected by F. E. Lloyd on footslopes and plains, Zacatecas, Mexico, 1908 (no. 14).

This species is nearest *O. grahamii*, from which it differs in its shorter, more terete joints, much shorter spines, and purple, not yellow, flowers.

Called "perro" by the Mexicans.

Type U. S. National Herbarium no. 535116.

EXPLANATION OF PLATE XXVII.—From photograph taken by F. E. Lloyd in northern Zacatecas.

Echinocereus rigidissimus (Engelm.) Rose.

Echinocereus pectinatus rigidissimus Engelm. Proc. Am. Acad. **3**: 279. 1856.

Echinocereus pectinatus robustus Bauer, Gartenflora **1890**: 513. *pl. 1331.* 1890.

This Echinocactus is sometimes known in the trade as *Cereus candicans*, *Cereus rigidissimus*, *Echinocereus robustior*, *Cereus robustior*, etc.

It is clearly distinct from both *Echinocereus pectinatus* and *Echinocereus caespitosus* and I have no hesitancy, therefore, in raising it to specific rank.

Echinocereus centralis (Coult.) Rose.

Cereus pectinatus centralis Coult. Contr. Nat. Herb. **3**: 386. 1896.

Echinocereus pectinatus centralis Schum. Gesamtb. Kakteen 271. 1899.

Professor Coulter when first describing this plant as a variety questioned whether it might not be a good species. It is quite distinct from true *Echinocereus pectinatus* as well as *Echinocereus rigidissimus*.

ONAGRACEAE.

A NEW SPECIES OF GAURA AND ONE OF LAVAUXIA.

Gaura grandiflora Rose, sp. nov.

A rather coarse perennial, 40 to 60 cm. high; stems herbaceous, branching, the axis percurrent, with both long and short pubescence; branches many, ascending, more or less purplish; leaves lanceolate, 4 to 6 cm. long, acute, somewhat toothed, pubescent on both surfaces; inflorescence somewhat pubescent, often early glabrate; calyx buds glabrous; calyx tube slender, 3 to 3.5 cm. long; petals 2 to 2.5 cm. long; anthers linear, attached near their middle; ovary and fruit glabrous, the latter 7 mm. long.

Probably common in the mountains of Chihuahua and Durango. It has been confused with *Gaura mutabilis* of central Mexico, but is easily distinguished by its glabrous calyx and fruit.

The following material has been examined:

Durango: Papasquaro, E. W. Nelson, August 7, 1898 (no. 4671, type); not far from Durango City, Dr. E. Palmer, 1896 (no. 270).

Chihuahua: High plain between Cusihuisiachic and Guerrero, C. G. Pringle, September 5, 1887 (no. 1244).

Type U. S. National Herbarium no. 332725.

Lavauxia palustris Rose, sp. nov.

Acaulescent, perennial; basal leaves erect, narrowly lanceolate, sometimes 10 cm. long, acute, nearly entire above, more or less lacerate below, shortly petioled, puberulent; calyx tube slender; tips of calyx lobes linear and free in bud; fruit sessile, winged, 14 mm. long.

Collected by Dr. C. G. Pringle in damp hollows just south of Buena Vista Station, Hidalgo, August 10, 1904 (no. 8929).

Type U. S. National Herbarium no. 462042.

This species is somewhat similar to *L. triloba*, but has differently cut leaves.

THE SUBFAMILY LOPEZIEAE.

Dr. Rudolf Raimann, in Engler & Prantl's Pflanzenfamilien, has very properly proposed the name Lopezieae for the irregular-flowered division of the Oenotheraceae. He includes four genera in this group. Of these four genera three are monotypic, and hence practically all the species of the group belong to one genus, viz, Lopezia. In the genus Lopezia 33 species have been named or described and a considerable number of new ones have recently been collected, of which 9 are to be found in this paper.

A careful review of the material which has been accumulating in the National Herbarium leads me to the conclusion that there are three genera to be taken out of Lopezia, each of which contains two species.

Of the other genera, Semeiandra and Diplandra, a representation has recently been added to the National Herbarium, but Reisenbachia is only known to me from Presl's plate.

The following key to seven genera should be helpful:

KEY TO GENERA.

Petals none; stamen one..... Reisenbachia.
Petals 4; stamens two.
  Stamens alike and perfect..... Diplandra.
  Stamens dissimilar, only one perfect.
Sepals more or less united into a tube.
  Calyx tube long and slender; stamens long-exserted.. Semeiandra.
  Calyx tube short; stamens shorter than the calyx.... Pelozia.
Sepals distinct or nearly so.
  Petals sessile; style and stamens long-exserted..... Pseudolopezia.
  Petals more or less stalked.
    Flowers large (20 mm. or more long); shrubs 15 to 20 mm. long..... Jehlia.
    Flowers small (7 mm. or less long), annuals..... Lopezia.

REISENBACHIA.[a]

The genus Reisenbachia is only known from Haenke's material, which Presl has described and figured. Only a single species has been described and figured, this said to have been collected in Mexico, but no definite locality given. This is one of the plants which should be carefully looked for by Mexican collectors.

DIPLANDRA.[b]

The only known species of the genus Diplandra was collected in west Mexico by the botanists of the Beechey Exploring Expedition. Since then no collection of it has been reported. We now have good specimens obtained by Dr. E. Palmer from Tepic, near the type locality.

SEMEIANDRA.[c]

The genus Semeiandra was first collected near Tepic by the botanist connected with the Beechey Exploring Expedition and afterwards by T. Coulter and B. Seemann in western Mexico. No recent collection of it has been reported. We now have it in the National Herbarium from Dr. E. Palmer's collection made at Tepic, Nelson's in Jalisco, and Rose's in Sinaloa.

PELOZIA.

Pelozia Rose, gen. nov.

Sepals 4, linear, the lower one nearly distinct to the base, the three upper more or less united, the central one bearing a large gland a short distance above the base within, the two lateral ones forming with the lower one two small pouches or spurs at their base; petals 4, the two lower entire, attached to the calyx, the two upper borne on the three upper sepals; stamens 2, the lower petaloid, the upper perfect; style single, short; fruit a 4-celled capsule, shortly to narrowly oblong. Delicate annuals with thin alternate leaves, and small axillary flowers.

This genus is nearest Lopezia, but is well separated by the characters given. The fruit is not globular, but oblong, the sepals are not all distinct, but the three upper are united for a part of their length, and the lower sepal, while nearly distinct, forms with the adjacent sepals two short spurs. The three upper also bear a large gland within. The two lower petals are borne at the base of the flower, while the two upper are borne upon the sepals, are broader than the lower, and are not at all glandular at the top of the spur as in Lopezia.

Type species *P. laciniata*.

KEY TO SPECIES.

Upper petals entire; capsule elongated ..... *P. clavata.*
Upper petals laciniate; capsule short ..... *P. laciniata.*

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[a] Reisenbachia Presl, Rel. Haenk. **2**: 36. *pl. 54.* 1836. Type species *R. racemosa.*

[b] Diplandra Hook. & Arn. Bot. Beech. 291. *pl. 60.* 1839. Type species *D. lopezioides.*

[c] Semeiandra Hook. & Arn. Bot. Beech. 291. *pl. 59.* 1839. Type species *S. grandiflora.*

Pelozia clavata (Brandeg.) Rose. FIGURE 37.

Lopezia clavata Brandeg. Proc. Cal. Acad. II. **2**: 157. *pl. 4.* 1887.

Known only from southern Lower California, first collected by Mr. Brandegee and recently by Nelson and by Goldman.

FIG. 37.—Flower and fruit of *Pelozia clavata*. *a*, *b*, Two views of flower; *c*, capsule. Scale 2.

Pelozia laciniata Rose, sp. nov. FIGURE 38.

Stems 40 to 50 cm. high, scantily pubescent; leaves on slender petioles, lanceolate, thin, with shallow distant teeth; pedicels slender, 2 to 3 cm. long; sepals 4, acute;

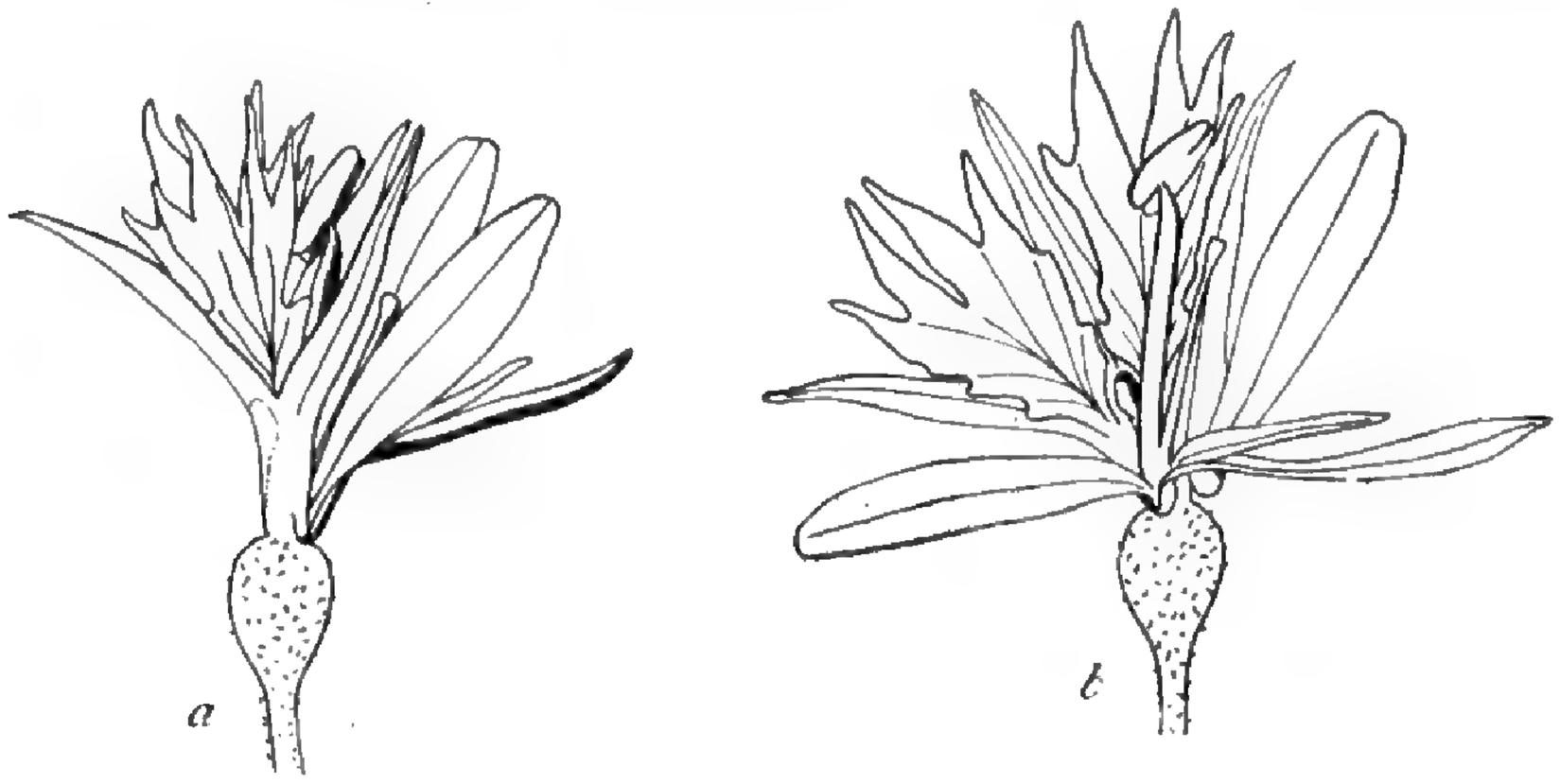

FIG. 38.—Flower of *Pelozia laciniata*. *a*, *b*, Two views, Scale 2.

petals pinkish purple, the two lower narrow, entire, the two upper broad, laciniate above, toothed below; sterile stamen narrow; ovary shortly oblong.

Collected by E. W. Nelson in mountains near Talpa, Jalisco, altitude 1,320 to 1,500 meters, March 7, 1897 (no. 4035).

Type in U. S. National Herbarium no. 327105.

PSEUDOLOPEZIA.

Lopezia insignis Hemsley is very different from true Lopezia and clearly deserves generic rank. Mr. Hemsley has called attention to some of its peculiarities and to its resemblance to *Semeiandra grandiflora*. *Lopezia longiflora* Decaisne seems to be congeneric.

Pseudolopezia Rose, gen. nov.

Sepals 4, nearly or quite distinct, valvate in the bud, equal, linear; petals 4, narrow, sessile, the two outer ones narrow, curved outward; the two inner erect, none glandular; stamens 2, elongated, one fertile, the other petaloid; style slender, elongated; fruit globose.

Habit not known, possibly a shrub; lower leaves opposite, broad, serrate; upper leaves, especially those of the inflorescence, alternate.

Type species *Lopezia insignis* Hemsl.

Pseudolopezia insignis (Hemsl.) Rose.

Lopezia insignis Hemsl. Diag. Pl. Nov. **1**: 16. 1878.

Pseudolopezia longiflora (Decaisne) Rose.

Lopezia longiflora Decaisne, Rev. Hortic. IV. **3**: 221. *pl. 12.* 1854.

JEHLIA.

This genus has heretofore not been technically published. It has been mentioned several times in print, as by Planchon[a] in 1851–52, and by W. J. Hooker in the Botanical Magazine in 1853. The name has sometimes been spelled Zehlia. Its species have heretofore rested in Lopezia, from which it differs strikingly in its habit and flowers.

FIG. 39.—Flower and flower parts of *Jehlia macrophylla*. *a*, Flower; *b*, petal; *c*, petal; *d*, sepal; *e*, stamen; *f*, anther; *g*, style. Scale 2.

Jehlia, gen. nov FIGURE 39.

Sepals 4, linear-lanceolate, broadest at base, erect-spreading, distinct; petals 4, two somewhat larger than the other two; stamens 2, the lower petaloid, the upper perfect; capsule globular. Half shrubby plants with large opposite leaves and large fuchsia-like flowers.

Type species *Lopezia macrophylla* Benth.

The following species seem to be congeneric:

Jehlia macrophylla (Benth.) Rose.

Lopezia macrophylla Benth. Pl. Hartw. 83. 1841.

Jehlia grandiflora (Zucc.) Rose.

Lopezia grandiflora Zucc. Flora **15**: Beibl. 101. 1832.

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[a] Fl. de Serres **7**: 177.

LOPEZIA.[a]

A review of the names of 33 species of Lopezia has consumed a large amount of time. Some of the results obtained have been very gratifying, while others have been most discouraging. Of these species only a few, in fact only four, have been described during the last fifty years. Most of them have been very briefly characterized and they have often been misunderstood. The material in our large herbaria is much confused.

Lopezia elegans Rose sp. nov. FIGURE 40.

Annual, about 40 cm. high, very much branched throughout, with very scanty short pubescence; leaves thin, lanceolate, the lower ones long-petioled, glabrous; fruiting pedicels slender, 10 to 12 mm. long, puberulent; flower buds obtuse, glabrous; sepals dark purple; petals violet-purple, the two lower 6 mm. long, the blade nearly orbicular, the two upper linear-oblong, not appendaged, each bearing a single gland at the top of the spur; sterile stamen bright crimson, deeply notched.

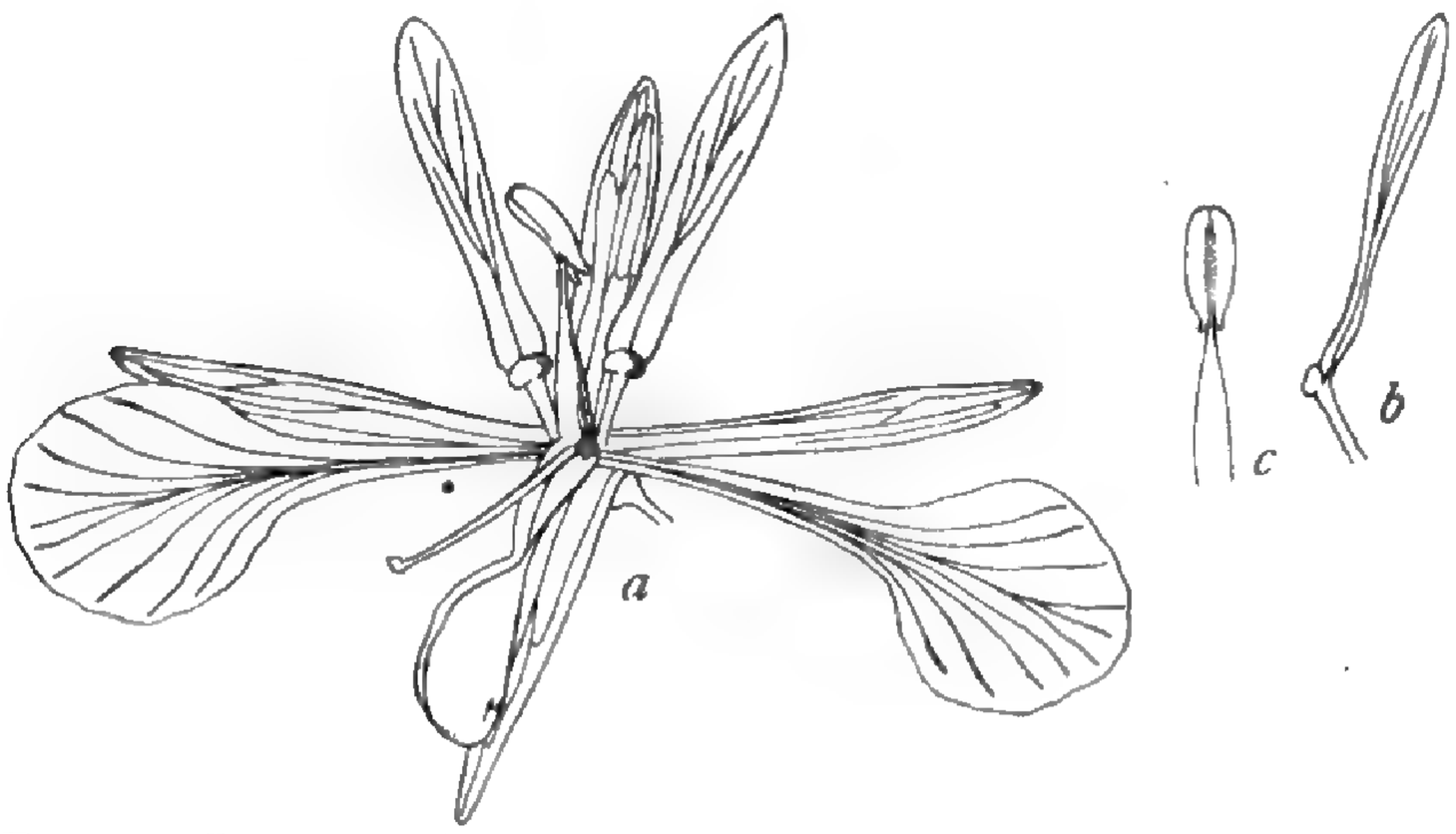

FIG. 40.—Flower and flower parts of *Lopezia elegans*. *a*, Flower; *b*, petal with basal gland; *c*, stamen. Scale 2.

Collected by Dr. E. Palmer near Alvarez, San Luis Potosí, September 28 to October 3, 1902 (no. 159).

Type U. S. National Herbarium no. 397706.

Lopezia glandulosa Rose, sp. nov. FIGURE 41.

Annual, about 40 cm. high, branching from the base; branches ascending, slender, with scanty pubescence below and with glandular hairs on the upper parts as well as on the pedicels; leaves opposite below, alternate above, lanceolate, obtuse, short-petioled, glabrate; pedicels 10 mm. or less long, glandular-pubescent; flower buds obtuse, glabrous; sepals dark red; petals purplish, the two lower spatulate, tapering gradually into the slender claw, 5 to 6 mm. long, the two upper linear-oblong, not appendaged, each bearing one gland at the top of the claw; sterile stamen deep purple; capsule globular, glabrous.

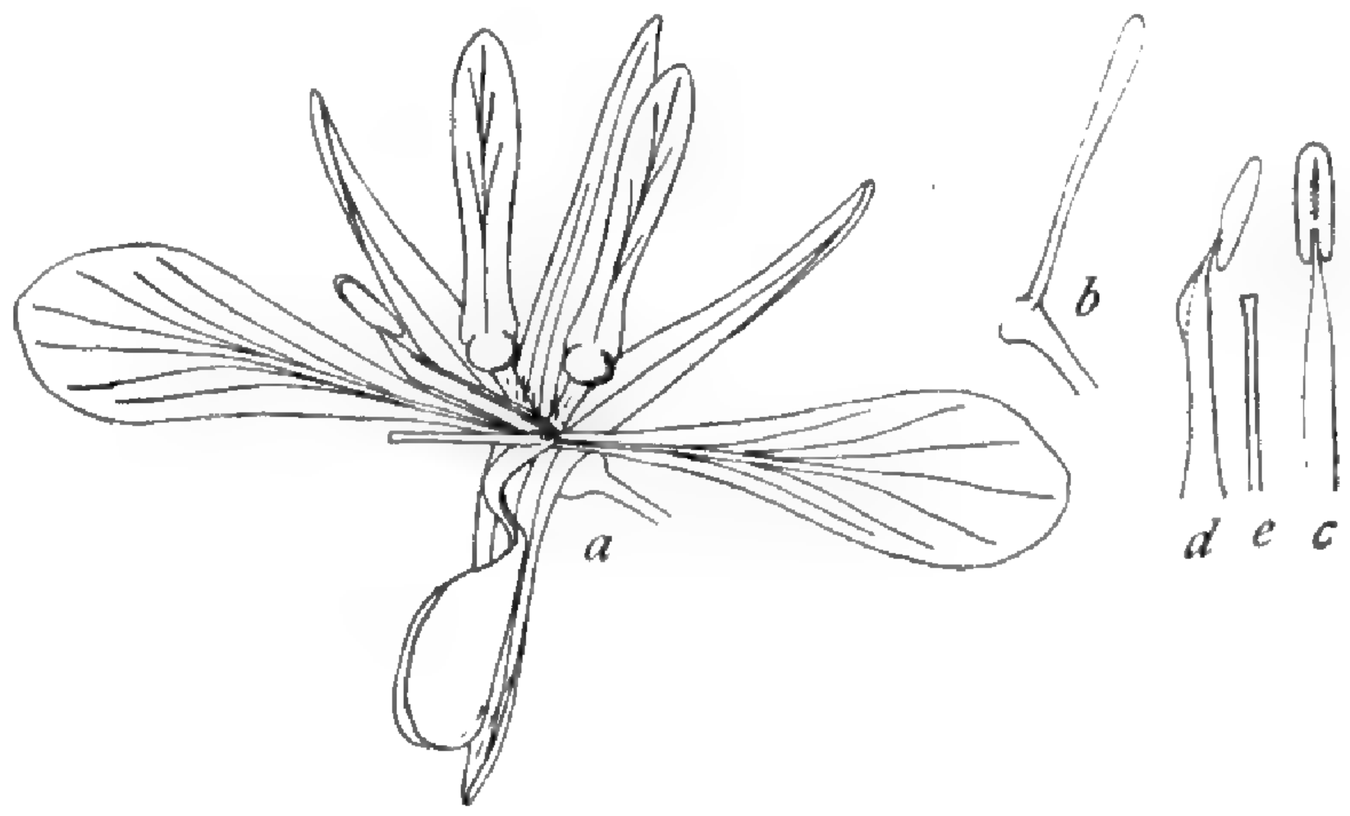

FIG. 41.—Flower and flower parts of *Lopezia glandulosa*. *a*, Flower; *b*, side view of petal with gland; *c*, *d*, stamens; *e*, style. Scale 2.

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[a] Lopezia Cav. Ic. **1**: 12 *pl. 18*. 1791. Type species *Lopezia racemosa*.

Collected by J. N. Rose on the road between Bolaños and Guadalajara, but in the State of Zacatecas, September 20, 1897 (no. 3034).

Type U. S. National Herbarium no. 301991.

Lopezia oaxacana Rose, sp. nov. FIGURE 42.

Probably annual, 60 cm. or more high with rather coarse but scanty pubescence; leaves lanceolate, acuminate, the larger ones 10 to 15 cm. long, including the slender petiole, the upper ones much smaller, somewhat pubescent on both surfaces, the margin with shallow serrations; pedicels becoming 20 mm. long or more in fruit, slender, bearing short glandular hairs; flower buds oblong, abruptly pointed, bearing tufts of hairs, especially at the top and base of the sepals; petals probably pinkish, nearly white in herbarium specimens, the two lower 7 mm. long, spatulate, the two upper narrowly spatulate, each with two appendages below and bearing two glands at the top of the claw; sterile stamen purplish; capsule globular, glabrous.

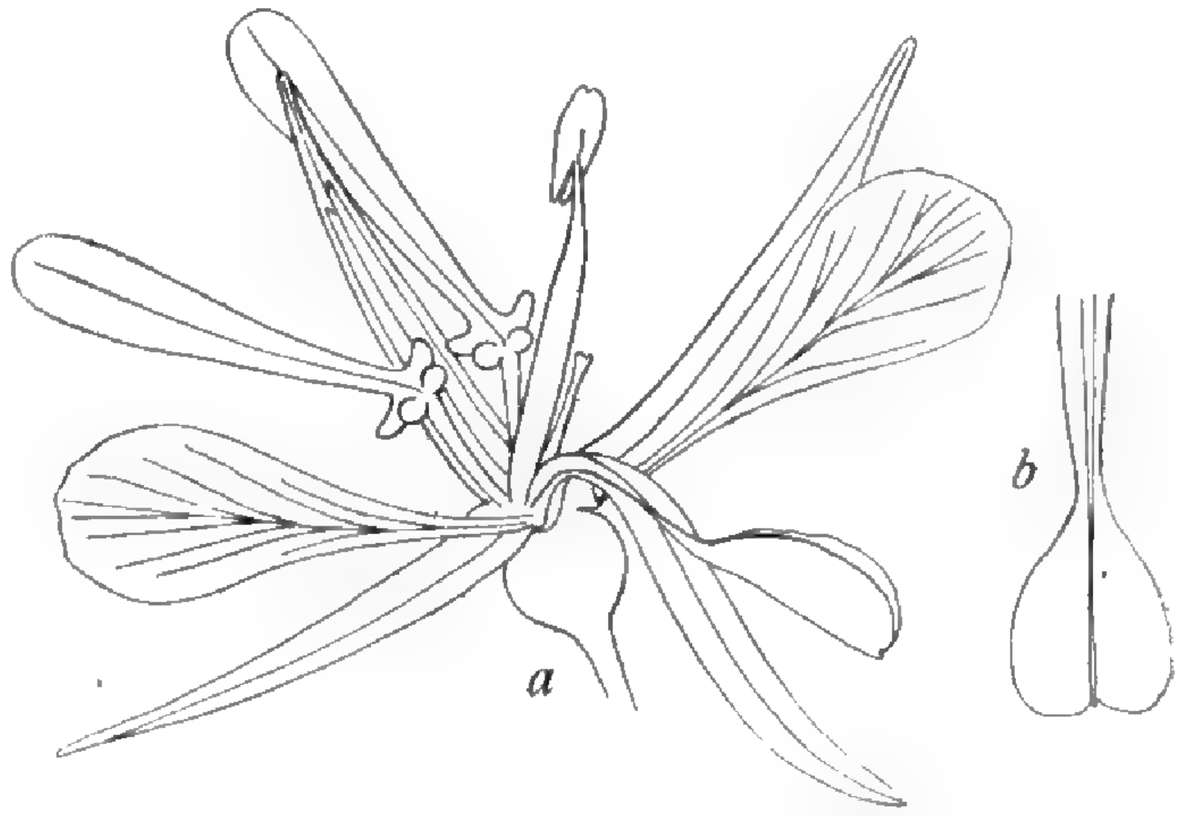

FIG. 42.—(*a*) Flower and (*b*) sterile stamen of *Lopezia oaxacana*. Scale 2.

Collected by C. Conzatti and V. Gonzales, October 10, 1897, no. 509 (type), and by Charles L. Smith, October 2, 1894 (no. 844), both on San Felipe, Oaxaca.

Type U. S. National Herbarium no. 574851.

Lopezia palmeri Rose, sp. nov. FIGURE 43.

Annual, much branched, the branches long and weak, with short, scanty spreading pubescence; leaves alternate, small (1 to 2 cm. long) acute, somewhat pubescent; pedicels slender, 1 to 2 cm. long, glabrous; sepals linear, glabrous, dark red; petals purplish, the two lower 5 mm. long, including the slender claw (somewhat longer than the lamina), the two upper spatulate, rounded at apex, each with two appendages below and bearing two glands at the top of the claw; sterile stamen shorter than the petals and deeper purple.

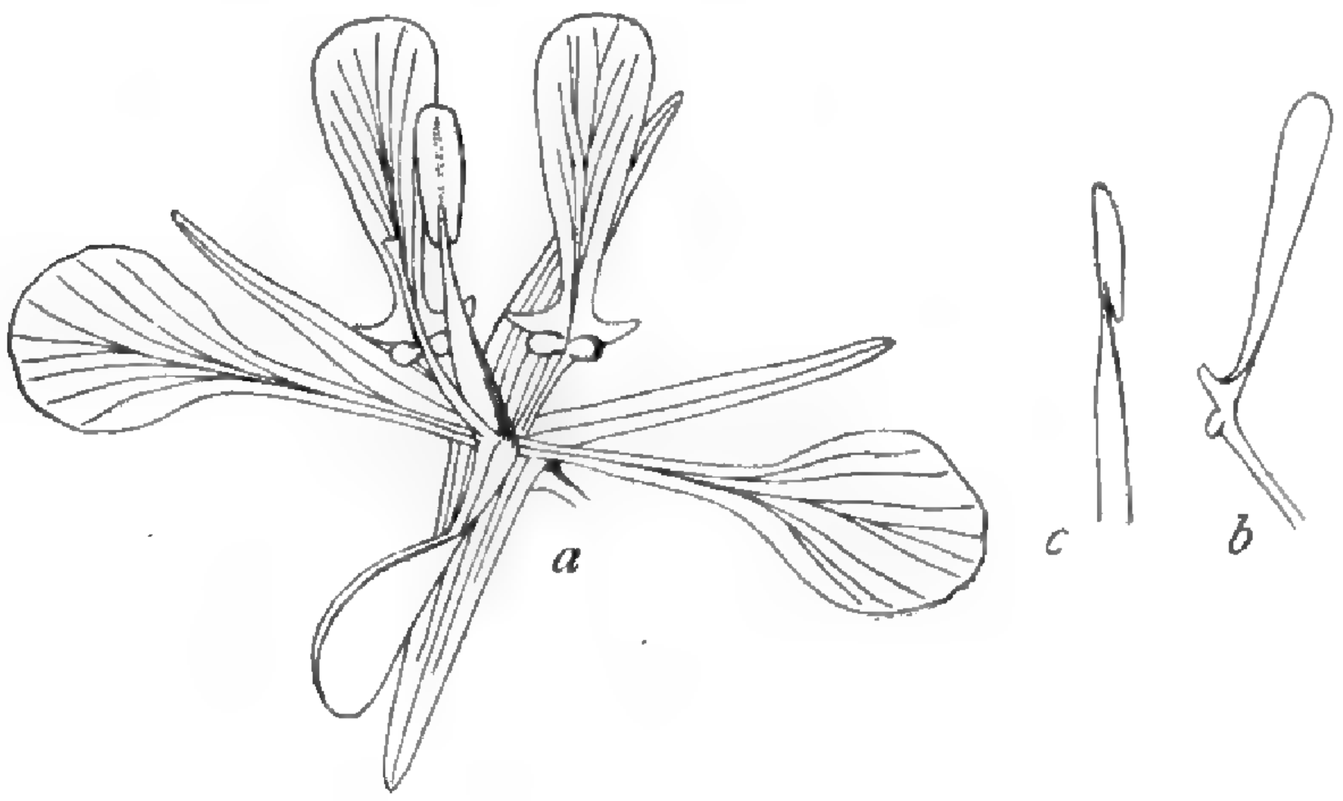

FIG. 43.—Flower and flower parts of *Lopezia palmeri*. *a*, Flower; *b*, petal with gland; *c*, stamen. Scale 2.

Collected by Dr. E. Palmer at San Ramon, Durango, April 21 to May 18, 1906 (no. 85).

Type U. S. National Herbarium no. 571100.

Lopezia parvula Rose, sp. nov. FIGURE 44.

Delicate annual, 10 to 25 cm. high, erect, nearly simple, with scanty short pubescence disposed in horizontal bands; leaves lanceolate, thin, ciliate, the lower ones opposite, the upper ones alternate; calyx buds glabrous, with a short blunt tip; sepals pale, tinged with pink; two lower petals spatulate, gradually tapering to the base; two upper petals pale purple, spatulate, not appendaged below, bearing a single gland at the top of the spur; sterile stamen pale purple; capsule glabrous.

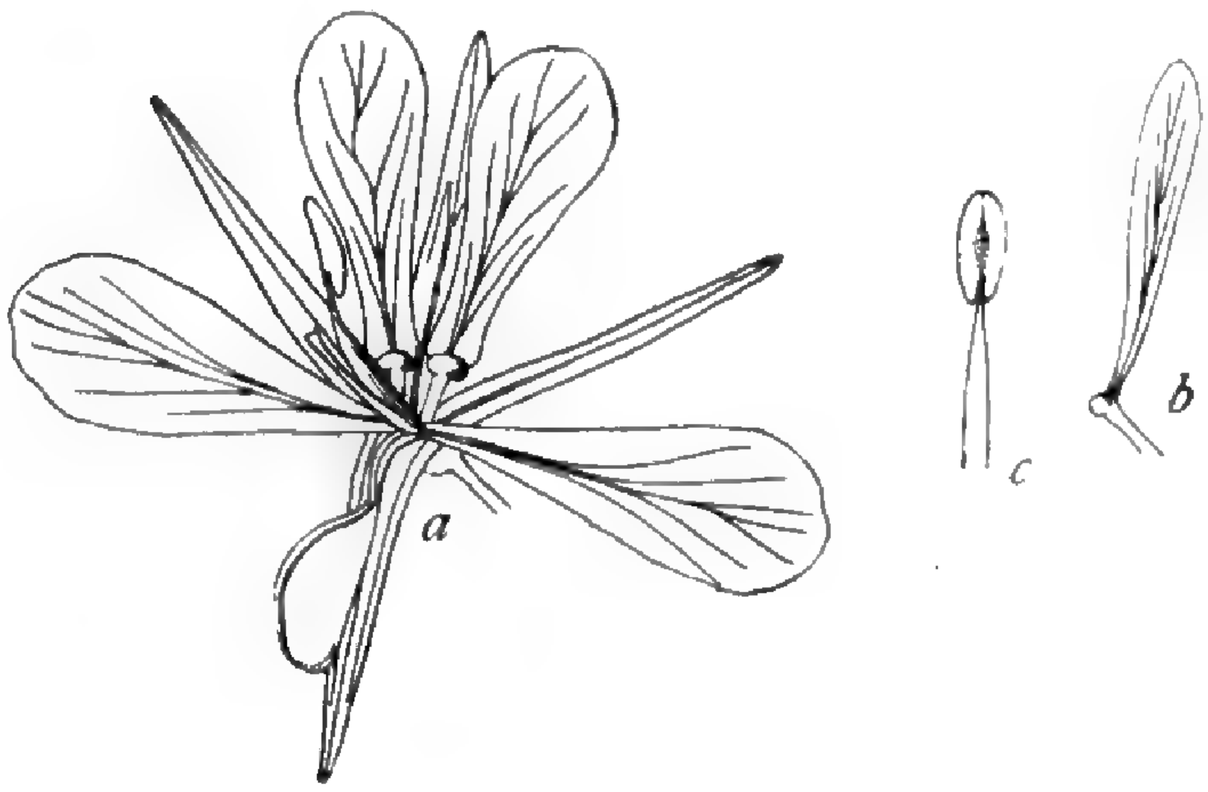

FIG. 44.—Flower and flower parts of *Lopezia parvula*. *a*, Flower; *b*, petal with gland; *c*, stamen. Scale 2.

Collected by E. W. Nelson near La Providencia, Durango, altitude 1,960 to 2,400 meters, September 11, 12, 1898 (no. 4987).

Type U. S. National Herbarium no. 333016.

Lopezia pringlei Rose, sp. nov.

FIGURE 45.

Annual, 40 to 56 cm. high, somewhat branching above, the pubescence rather scanty, chiefly of short crisped hairs or with some stipitate glands in the upper part; leaves alternate, lanceolate, acute, tapering at base into a short petiole, somewhat pubescent on both surfaces, thin, subentire; inflorescence a slender leafy raceme; bracts narrow, acute; pedicels 5 to 7 mm. long, glabrous; sepals glabrous, red; petals violet, the two lower spatulate, the two upper linear, not appendaged below, bearing each a single gland; capsule globular, glabrous.

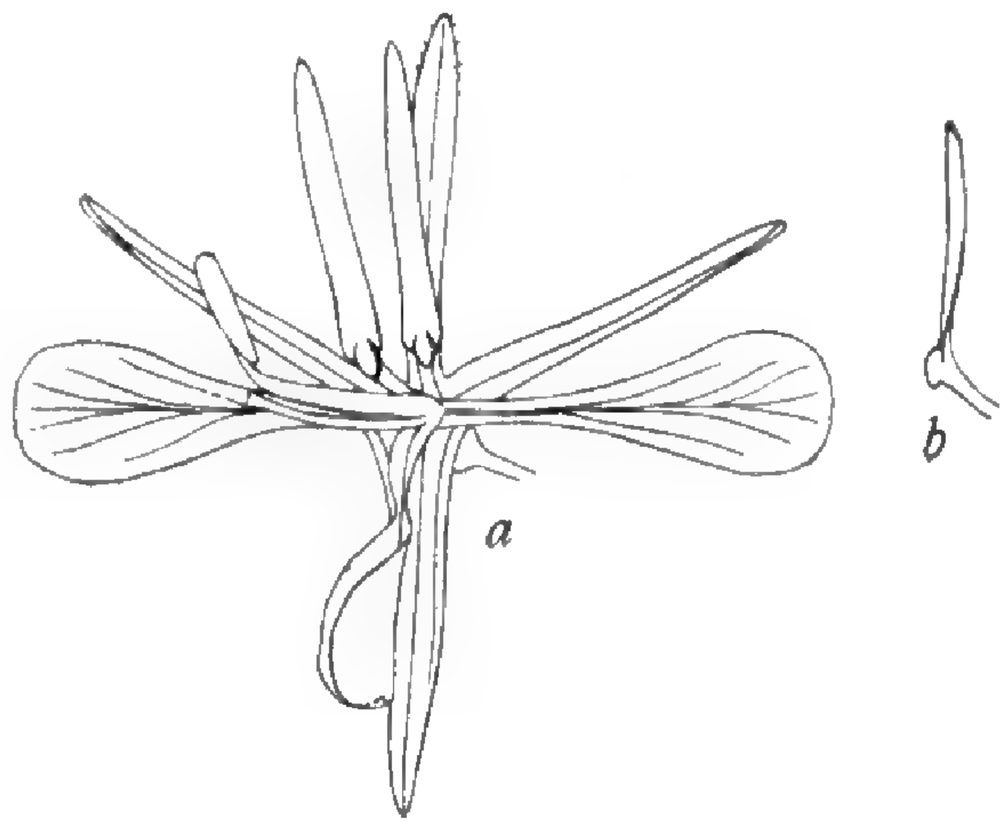

FIG. 45.—Flower and petal of *Lopezia pringlei*. *a*, Flower; *b*, side view of petal showing gland. Scale 2.

Collected by C. G. Pringle on the Sierra de San Filipe, Oaxaca, altitude 3,000 meters, 1906 (?) (no. 6005, type), and by E. W. Nelson near Reyes, Oaxaca, October 17, 1904 (no. 1716).

Type U. S. National Herbarium no. 461987.

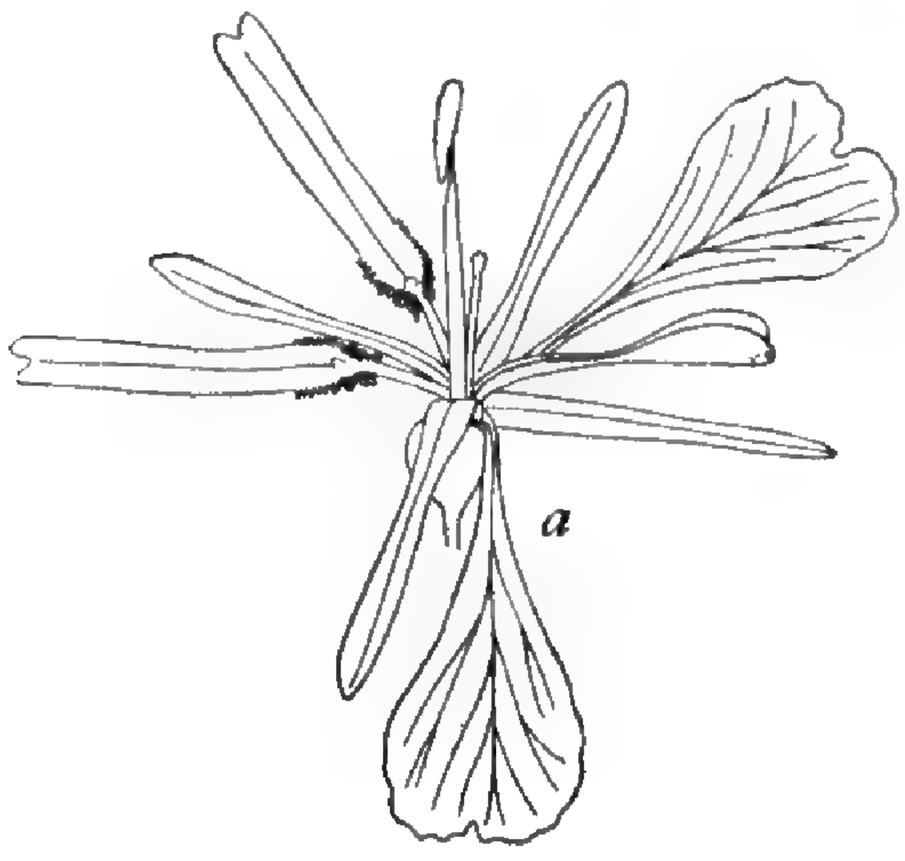

FIG. 46.—(*a*) Flower and (*b*) stamen of *Lopezia smithii*.

Lopezia smithii Rose, sp. nov.

FIGURE 46.

Annual, 6 to 7 cm. high, slightly winged, pubescent, much branched; leaves sessile or nearly so, acute, cuneate at base, crenate; pedicels slender, 12 to 15 mm. long; flower parts all purplish; sepals linear, 4 mm. long; two lower petals 6 mm. long, obovate, tapering into a long slender claw; upper petals with linear blade, not auriculate at base;

glands single, yellowish, fringed with short hairs; sterile stamen 3 mm. long, purplish.

Collected by Lucius C. Smith near Jaquacatlan, Oaxaca, altitude 1,290 meters, November 4, 1895 (no. 294).

Type U. S. National Herbarium no. 574852.

Lopezia stricta Rose, sp. nov. FIGURE 47.

Annual; stems rather strict, with a few erect branches, clothed with a short dense, somewhat reflexed pubescence; leaves lanceolate, somewhat mottled with red, short-petioled, obtuse, a little pubescent on both surfaces, the margins undulate; pedicels 2 to 3 cm. long; sepals linear, dark red, glabrous; petals pale pink (nearly white in herbarium specimens), the two lower 8 mm. long, including the slender claw, rounded at apex, the two upper nearly linear, with two appendages below and each bearing two glands at the top of the claw; sterile stamen shorter than the petals and deeper-colored; capsule orbicular, glabrous.

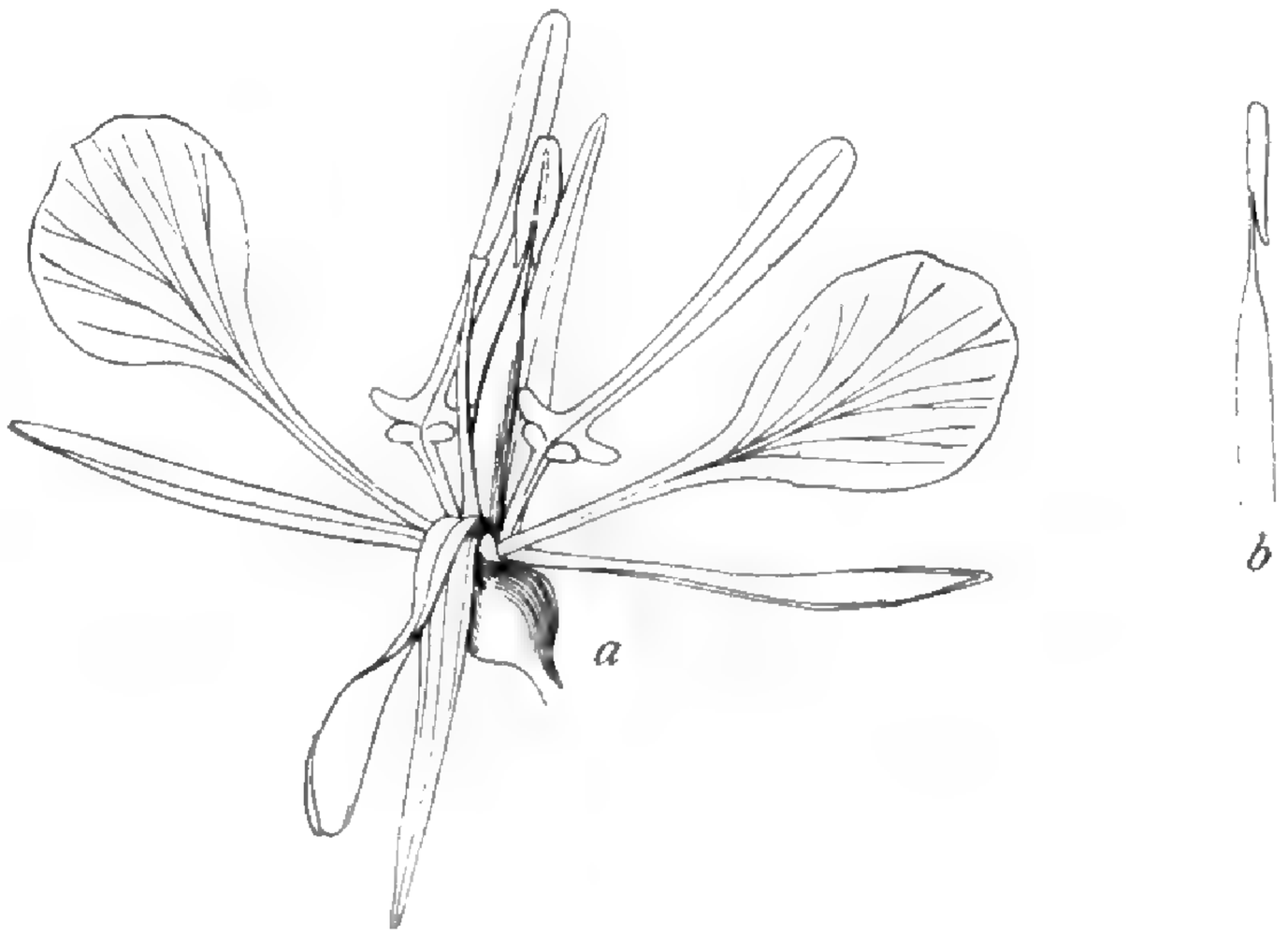

FIG. 47.—(*a*) Flower and (*b*) stamen of *Lopezia stricta*. Scale 2.

Collected by J. N. Rose in the Sierra Madre west of Bolaños, Jalisco, September 15 to 17, 1897 (no. 2979).

Perhaps nearest *Lopezia mexicana* H.B.K., but with paler petals and smaller glands on the upper petals.

Type U. S. National Herbarium no. 301735.

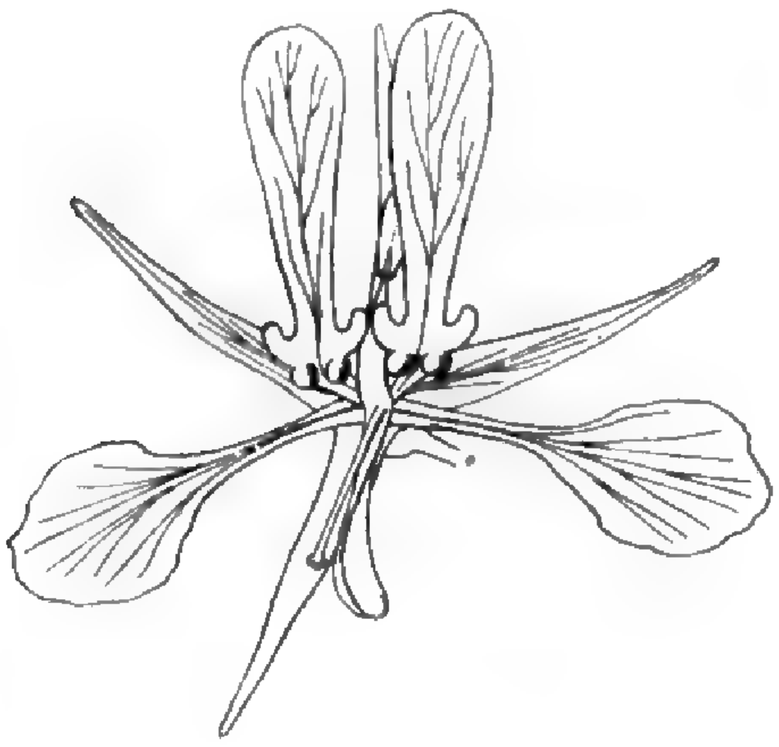

FIG. 48. Flower of *Lopezia violacea*. Scale 2.

Lopezia violacea Rose, sp. nov. FIGURE 48.

Annual, branching throughout, glabrous or with a short crisp pubescence; leaves alternate, lanceolate, short-petioled, rounded or broadly cuneate at base, obtuse, denticulate, glabrous; racemes terminating branches; pedicels slender, 12 to 18 mm. long; sepals linear, red, glabrous; petals violet, the two lower nearly orbicular, tapering below into a slender claw, the two upper spatulate-oblong, two-horned below and bearing each two glands at the top of the claw; sterile stamen shorter than the petals and paler in color; capsule orbicular, glabrous.

Collected by C. G. Pringle on the Sierra de Tepoxtlan, Morelos, altitude 2,350 meters, October 30, 1900 (no. 8358).

Type U. S. National Herbarium no. 381869.

APIACEAE.

A NEW SPECIES OF ARRACACIA AND ONE OF PRIONOSCIADIUM.

Arracacia purpusii Rose, sp. nov.

Stems herbaceous from slender rootstocks, glabrous, 30 to 40 cm. high; leaves 2-ternate; leaflets ovate, acute, 1 to 2.5 cm. long, serrate, glabrous; rays 5 to 7, nearly

equal, 4 to 5 cm. long; pedicels 4 to 5 mm. long; involucre wanting; bractlets of involucels several, linear, 3 to 4 mm. long; fruit ovate, 4 to 5 mm. long; stylopodium stout, conical.

Collected by C. A. Purpus at Bocca del Monte, Puebla, Mexico, June, 1907 (no. 2509).

Type U. S. National Herbarium no. 574890.

Prionosciadium humile Rose.

Peucedanum madrense S. Wats. Proc. Am. Acad. **25**: 150. 1890.

On account of an earlier published *Prionosciadium madrense* a new specific name is here given to this species.

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SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM

CONTRIBUTIONS

FROM THE

UNITED STATES NATIONAL HERBARIUM

VOLUME XII, PART 8

THE ALLIONIACEAE OF THE UNITED STATES

WITH NOTES ON MEXICAN SPECIES

By PAUL C. STANDLEY

WASHINGTON
GOVERNMENT PRINTING OFFICE
1909

BULLETIN OF THE UNITED STATES NATIONAL MUSEUM.

ISSUED APRIL 23, 1909.

PREFACE.

The accompanying paper on the Allioniaceae, chiefly those of the United States, is by Mr. Paul C. Standley, assistant professor of botany in the Agricultural College of New Mexico. It was elaborated under the direction of Prof. E. O. Wooton, of the same institution. It embodies the results both of field work and of a study of herbarium material from most of the western herbaria, as well as the National Herbarium, and of all the literature of the subject. Mr. Standley has aimed at a comprehensive and thorough treatment of the whole group and has found it necessary to establish several new genera and restore others not recently accepted. The number of sheets studied belonging to the National Herbarium was 1,068. Of the 50 new species here described the types of 20 are in the National Herbarium, and others are represented here by duplicate types. The illustrations, except Plates XXXIV and XXXV, are from drawings made by Mr. Standley himself.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

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THE ALLIONIACEAE OF THE UNITED STATES, WITH NOTES ON MEXICAN SPECIES.

By Paul C. Standley.

INTRODUCTION.

Of all the families of North American plants none, probably, have been more neglected than the Allioniaceae. In the last fifty-five years no monograph of the American representatives of the family has appeared. Linnæus in the Species Plantarum published two North American genera of this family—Mirabilis, with one species, and Boerhaavia with four species, only two of which, however, occur in the region under consideration. Other genera and species of the family were soon published, all of them in scattered publications. The first treatment of the family as a whole was that of Choisy in De Candolle's Prodromus. In that work, 10 North American genera were described and, under them, 31 species, not including several species of Pisonia. Choisy's work is interesting and at times helpful, but the author labored under the difficulty of not having seen some of the plants of which he wrote, as a result of which some serious mistakes were made. The next work of any importance dealing with the family was that of Asa Gray, in the Botany of the Mexican Boundary Survey;[a] that paper is a very brief one and includes descriptions of but few species, although Gray described at various times a considerable number of new genera and species in the Allioniaceae.

Dr. Anton Heimerl, of Vienna, probably the foremost student of this group of plants, contributed to Engler and Prantl's Natürlichen Pflanzen-Familien[b] the section dealing with the Allioniaceae, a paper valuable for the excellent discussion it contains of the various genera. The work is exceedingly conservative, and the family is treated as

[a] A. Gray in Torrey, Bot. Mex. Bound. 172–175. 1859. (Emory, Rep. U. S. & Mex. Bound. Surv. Vol. II, Pt. 1.)

[b] Teil III, Abt. 1 b, pp. 14–32. 1889.

European botanists so commonly treat groups of American plants. The genus Allionia, for instance, is made a mere section of Mirabilis, and other adjustments of the same kind are made which, although they may be the easiest way of disposing of genera, are certainly not conducive to clearness.

In 1902 Mr. M. E. Jones published in his Contributions to Western Botany [a] a paper dealing with the family as it is represented in the Great Plateau region, an area in which are found almost all the species at that time known to occur in the United States. In the same year there appeared in the Bulletin of the Torrey Botanical Club [b] a paper by Dr. Per Axel Rydberg dealing with the Allioniaceae of the Rocky Mountains and containing descriptions of a number of new species, which is undoubtedly the most critical and valuable publication dealing with any group of the American representatives of the family.

The work, the results of which are here discussed, was carried on at the New Mexico Agricultural College during the years 1907 and 1908. The writer had the privilege of examining all the material of the Allioniaceae to be found in the herbaria of the following institutions and individuals: National Herbarium; Missouri Botanical Garden, including the Engelmann and Bernhardi herbaria; Field Museum of Natural History; University of California, including the Brandegee Herbarium; University of Wyoming; University of Nevada; University of Arizona; Mr. A. A. Heller, Mr. K. K. Mackenzie, Prof. E. O. Wooton, and the New Mexico Agricultural College. He wishes here to express his obligations to the curators or owners of these collections; also to Mr. G. E. Osterhout, who furnished material for examination. It was only through the kindness of those who have charge of these various collections that this work was made possible. The author is under special obligations to Prof. E. O. Wooton, under whose direction the work was begun and completed.

The present paper is intended to cover all the representatives of the family occurring within the United States and most of those found in Mexico and the West Indies, with the exception of the genus Pisonia.

The drawings are by the author, with the exception of Plates XXXIV and XXXV, which are by the German artist, W. Liepoldt. The author wishes especially to express his indebtedness to Dr. Anton Heimerl, who forwarded to him the two latter drawings and the descriptions which accompany them, with permission to use them here. Doctor Heimerl's notes attached to the sheets of the National Herbarium have also in several instances been of great help in the preparation of this paper.

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[a] **10**: 34–54.

[b] **29**: 680–693.

SYSTEMATIC TREATMENT.

ALLIONIACEAE Reichenb. Consp. 85. 1828.

Nyctaginaceae Lindl. Nat. Syst. ed. 2. 213. 1836.

Annual or perennial herbs, often shrubs or trees, with branching or dichotomous-forking stems; stems usually with swollen joints, sometimes armed with spines; leaves opposite or alternate, simple, entire, or sometimes repand, exstipulate; inflorescence various; flowers regular, perfect or sometimes unisexual, often subtended by bracts which form a calyx-like involucre; perianth consisting of a calyx only, this often showy and corolla-like, tubular, funnelform, or campanulate, usually deciduous above the ovary; stamens 1 to many; filaments filiform, distinct or united at the base, often unequal in length, exserted or included; anthers 2-celled, opening by longitudinal fissures; ovary 1-celled, superior but surrounded by the calyx tube, sessile or short-stalked; style slender; stigma usually capitate; ovule solitary, erect, sessile; fruit an anthocarp, indehiscent, fleshy, leathery, or hard, angled, ribbed, grooved, or winged; seed erect, with a hyaline testa which is free from or adnate to the pericarp; endosperm variable; embryo straight or curved.

The family consists of about 26 genera and 250 species. Most of the genera and species are confined to the Western Hemisphere. In the Old World there are found one species of Allionia, several of Boerhaavia and Pisonia, and the monotypic South African genus Phaeoptilon. Of these only one, a species of Boerhaavia, occurs in Europe (in southern Spain), the others being confined to Africa, southern and eastern Asia, and the islands of the Pacific. Doctor Heimerl mentions the fact that one or two American species have become naturalized at various places in Europe.

In the Western Hemisphere there seem to be two centers of distribution, one in tropical and subtropical South America and the West Indies, characterized by such genera as Pisonia, Neea, Bougainvillea, and others; the other in Texas, New Mexico, Arizona, California, and northern Mexico, especially characterized by such genera as Boerhaavia, Abronia, Acleisanthes, Allionia, but presenting several others. Of the entire number of genera included in the family 16 occur in the latter region embracing more than 160 species. It is the region about this center that this paper attempts to cover.

KEY TO THE GENERA.

Flowers involucrate.
- Involucre polyphyllous, composed of 5 to 15 bracts which surround a few-flowered or many-flowered head.
  - Fruit winged or at least with rudimentary wings; bracts few; stamens and pistil included.
    - Wings not completely encircling the fruit but interrupted above and below ---- 1. ABRONIA (p. 306).
    - Wings completely encircling the fruit -- 2. TRIPTEROCALYX (p. 327).
  - Fruit not winged but merely 10-ribbed; bracts more numerous; stamens and pistil exserted ---------- 3. NYCTAGINIA (p. 330).

Involucre gamophyllous; flowers 1 to several.
- Fruit with prominent lateral wings which are often toothed; with 2 rows of glands along the dorsal surface---------- 4. WEDELIA (p. 331).

Fruit not winged.
Fruit with 5 prominent ribs; involucre enlarged and membranous in fruit___ 5. ALLIONIA (p. 334).
Fruit smooth or somewhat 5-angled but not ribbed; involucres not membranous and usually not enlarged in fruit.
Involucre rotate, slightly enlarged in fruit, 3-flowered_____ 6. ALLIONIELLA (p. 356).
Involucres campanulate, not enlarged in fruit.
Involucres containing several flowers which have a rather thick tube of medium length or sometimes rather long____ 7. QUAMOCLIDION (p. 357).
Involucres 1-flowered.
Perianth campanulate____ 8. HESPERONIA (p. 360).
Perianth funnelform with a long, slender tube_____ 9. MIRABILIS (p. 366).
Flowers without an involucre or each flower subtended by 1 to 3 bracts.
Fruit with conspicuous, thin, membranous wings_ 16. SELINOCARPUS (p. 387).
Fruit not conspicuously winged; wings when present thick and coriaceous.
Flowers large, 2 cm. long or usually more.
Perianth with a long slender tube and broad limb, each flower subtended by 2 or 3 small, narrow bracts_____ 10. ACLEISANTHES (p. 369).
Perianth campanulate, subtended by a large, ovate, leaf-like bract_____ 11. HERMIDIUM (p. 372).
Flowers small, 2 cm. long or usually much less.
Fruit 10-angled or 10-ribbed.
Fruit asymmetrical, flowers in racemes_____ 12. SENKENBERGIA (p. 372).
Fruit symmetrical, flowers not in racemes.
Fruit with conspicuous, mucilaginous glands; climbing or reclining plants with thin leaves; flowers in umbels____ 12. SENKENBERGIA (p. 372).
Fruit without conspicuous glands; erect plants with very thick leaves; flowers irregularly clustered, not in umbels_____ 14. ANULOCAULIS (p. 374).
Fruit 5-angled, 5-ribbed, or sometimes with low, thick wings; perianth campanulate _____ 15. BOERHAAVIA (p. 375).

1. ABRONIA Juss.

Abronia Juss. Gen. 448. 1789.

Tricratus L'Her.; Willd. Sp. Pl. 1: 807. 1799.

Annual or perennial herbs, erect or prostrate, glabrous or pubescent; leaves opposite, petioled, the blades unequal and entire; flowers few or numerous in the head, this surrounded by 5 or more distinct bracts; perianth colored and

corolla-like, with an elongated tube which is constricted above the ovary, expanding above into a 5-lobed limb; stamens 3 to 5, included, their filaments unequal; fruit leathery, usually 3 to 5-winged but sometimes only ribbed or almost smooth; seed filling the pericarp, to which it adheres; one of the cotyledons abortive, the seedling thus appearing monocotyledonous.

Of the history of this genus Doctor Rydberg says:[a] "In the original publication no type species was mentioned. The genus was described from a plant collected on Dé la Pérouse's journey in California and cultivated by Mr. Colignon. Hooker, in his Exotic Flora,[b] identifies Colignon's plant as *Abronia umbellata*. The type of Tricratus is the same."

The genus is a North American one and is confined chiefly to the western part of the United States. One or two species extend into southwestern Canada and three into northwestern and northeastern Mexico. On the east the range extends into western Nebraska and Kansas, and on the west to the Pacific coast. The writer has seen no specimens from southern central Arizona, where the genus would be expected to occur, since it is common to the east in southern New Mexico and to the west in California, but Prof. J. J. Thornber states that it is represented in that part of the Territory by one or more species.

Most if not all the species seem to be in a variable or mutating state. They are rather numerous and most of them are confined to comparatively small areas. One of the most striking illustrations of the latter fact is found in *A. carletoni*, the type of which was collected about sixteen years ago in eastern Colorado, but which, as far as the writer is able to learn, has never been collected since. Its closest ally has not been collected nearer than 350 miles to the south.

The writer has tried, but with little success, to arrange the species in a lineal sequence. There are so many different lines along which different species vary that it is almost, if not quite, impossible to do this. There are several groups of species, for instance, which are closely related to *A. fragrans;* but these groups vary in different directions so that it is impracticable to arrange them in a lineal succession which will show their closest relationships. This is true of sections as well as of species and applies equally to the other large genera such as Allionia and Boerhaavia. It is also difficult to arrange the species in sections, and the arrangement which is given here is not at all satisfactory on account of the many intergradient species. The *maritima* and *latifolia* groups are distinct enough. The *fragrans* and *turbinata* groups are most difficult of separation on account of such forms as *A. carletoni* and *A. nealleyi*, either of which is as closely related to *A. fragrans* as to *A. turbinata*. The *nana* group is easiest to separate because of the peculiar habit of the plants, a habit with which other peculiar characteristics are concurrent.

Among the various characters which are of use in separating species of Abronia the habit is of importance, especially in the *turbinata* group. This is a character that is not well shown in dried specimens generally, for in such specimens it is difficult to tell whether a stem is erect, ascending, or prostrate. The pubescence is variable, but not nearly so much so as in the genus Boerhaavia. While the leaves upon a single plant are usually of the same general shape, the earlier ones commonly differ somewhat from the later, especially in size. It is worthy of note that in all the Abronias the opposite leaves are unequal in size, sometimes very strikingly so, a peculiarity characteristic of some other genera of the family. The difference in outline in opposite leaves is also sometimes conspicuous.

The size and shape of the involucral bracts are among the best characters by which to distinguish species in this genus, for they show little variation

[a] Bull. Torr. Club 29 : 681. 1902.

[b] 3 : *pl. 193, 194.* 1827.

within a group of plants that may be taken as a species; the same is true of the size of the flowers. The color of the flowers is more or less variable, white-flowered forms of normally red-flowered species being occasionally found. The fruit is perhaps of the most importance. The outer and inner fruits in a single head are often very different in form; but the inner ones in different heads on the same plant are remarkably uniform in shape. A word may be necessary in explanation of the terms "turbinate" and "biturbinate," as employed by Doctor Rydberg, whose usage I have followed. The distinction between the two is difficult to understand from mere descriptions, but I hope that by reference to the accompanying drawings it may be more easily grasped.

KEY TO THE GROUPS.

Flowers yellow ..... I. LATIFOLIAE.
Flowers red or white, never yellow.
  Flowers dark, deep red; fruit large and with very thick wings ..... II. MARITIMAE.
  Flowers lighter, purplish red or white; fruit smaller and with thinner wings.
    Low perennials which are almost acaulescent, with a short and thick caudex ..... IV. NANAE.
    Annuals or perennials with long stems which have conspicuous internodes.
      Involucral bracts small, usually not scarious, mostly narrow.
        Central cavity of the fruit extending quite to the edges of the wings when wings are present ..... V. TURBINATAE.
        Central cavity of the fruit not extending quite to the edges of the wings ..... III. UMBELLATAE.
      Involucral bracts usually much larger, scarious, mostly broad ..... VI. FRAGRANTES.

KEY TO THE SPECIES BY GROUPS.

I. LATIFOLIAE. Prostrate perennials with thick, fleshy roots, and thick, orbicular leaves; fruit coriaceous, large, with 4 or 5 thick wings which are widest in the middle and narrowed above and below. A single species ..... 1. *A latifolia.*

II. MARITIMAE. Prostrate perennials; fruit coriaceous, large, with 4 or 5 thick wings, the central cavity extending almost or quite to the edges of the wings; bracts thick, narrowly elliptical. A single species ..... 2. *A. maritima.*

III. UMBELLATAE. Prostrate annuals or perennials; flowers red (white in one species); bracts mostly lanceolate, small; fruit with thin or rarely somewhat thickened wings, the central cavity not extending quite to the edges of the wings.
Fruit not winged; plant very small; leaves orbicular; only 3 or 4 flowers in each head ..... 17. *A. alpina.*
Fruit winged.
  Stems puberulent or glabrous, not villous.
    Wings thickened and coriaceous.
      Stems almost glabrous, internodes long, flowers red ..... 3. *A. insularis.*
      Stems puberulent, internodes short, flowers white ..... 4. *A. alba.*

Wings of the fruit thin.
Flowers about 1 cm. long.
Fruit with broad wings which are prolonged above the body of the fruit and are acute ---------- 5. *A. acutalata.*
Fruit with very narrow wings which are widest in the middle and not prolonged above ---------- 6. *A. breviflora.*
Flowers 1.5 cm. long or more.
Leaves thick, broad, and shining; bracts thick ---------- 10. *A. neurophylla.*
Leaves thin, not shining, narrow, or if broad puberulent; bracts thin.
Wings truncate above or sloping up to the short beak ---------- 7. *A. umbellata.*
Wings prolonged above the body of the fruit.
Leaves narrowly elliptical or lanceolate; wings of fruit much narrowed below ---------- 8. *A. minor.*
Leaves wider and irregular; wings little narrowed below ---------- 9. *A. variabilis.*
Stems typically villous.
Fruit small, with only 2 wings, which are large, considering the size of the body of the fruit; plants erect or ascending when young, later prostrate ---------- 16. *A. pogonantha.*
Fruit larger, almost always with more than 2 wings.
Fruit with the wings little narrowed below and broad; body of the fruit small, not ribbed or pitted; leaves more or less sinuate-margined.
Wings rather thin; leaves only slightly sinuate; plant stout ---------- 11. *A. platyphylla.*
Wings thick and tough; leaves conspicuously sinuate; plant slender ---------- 12. *A. gracilis.*
Fruit with the wings much narrowed below; body of the fruit large and conspicuous, frequently strongly ribbed or pitted; leaves not sinuate.
Flowers about 12 mm. long ---------- 13. *A. villosa.*
Flowers about 25 mm. long.
Wings not much prolonged above the body of the fruit, the sinus between them broad and shallow ---------- 14. *A. pinetorum.*
Wings much prolonged above the body of the fruit, forming a deep and narrow sinus ---------- 15. *A. aurita.*

IV. NANAE. Low perennials, 20 cm. high or less, with thick woody caudices; fruit with thin, double wings, the central cavities extending to their edges.

Bracts narrowly lanceolate ---------- 18. *A. covillei.*
Bracts elliptical or obovate, broader.
Leaves broadly or narrowly elliptical ---------- 19. *A. nana.*
Leaves narrowly oblanceolate ---------- 20. *A. bigelovii.*

V. TURBINATAE. Annuals, erect, ascending, or prostrate; flowers red or almost white; wings of the fruit often surmounted by disks; bracts small, usually 1 cm. long or less, and usually narrowly lanceolate.

Bracts elliptical or obovate, obtuse.
Leaves broad, elliptical or ovate; fruit not winged ..... 21. *A. exalata.*
Leaves narrowly lanceolate; fruit with prominent wings, which are surmounted above by disks ..... 27. *A. carletoni.*
Bracts lanceolate, acute.
Flowers pale, whitish; plants with a tendency to erectness if not quite erect ..... 22. *A. turbinata.*
Flowers red; plants prostrate.
Stems almost or quite glabrous; leaves obtuse, frequently cordate at the base ..... 23. *A. arizonica.*
Stems viscid-puberulent.
Leaves conspicuously lobed ..... 24. *A. lobatifolia.*
Leaves not conspicuously lobed.
Leaves mostly ovate, rounded or broadly cuneate at the base: seed lanceolate, 2 to 2.5 mm. long ..... 25. *A. torreyi.*
Leaves narrowly lanceolate, much narrowed at the base; seed narrowly ovate in outline, 1.5 mm. long ..... 26. *A. angustifolia.*

VI. FRAGRANTES. Perennials, mostly erect or ascending; flowers white or greenish: fruit turbinate or biturbinate, variously winged or ridged.

Fruit biturbinate, i. e., tapering at both ends; or, if inclined to be turbinate, merely ridged and not winged.
Stems pubescent.
Stems hirsute; fruit not very decidedly biturbinate, almost truncate above; bracts 7 mm. long, lanceolate ..... 39. *A. robusta.*
Stems variously pubescent, but not hirsute.
Flowers 12 mm. long or less.
Plant prostrate; bracts lanceolate ..... 44. *A. ammophila.*
Plant erect; bracts ovate ..... 37. *A. nealleyi.*
Flowers about 20 mm. long.
Bracts more than 10 mm. long ..... 41. *A. fragrans.*
Bracts less than 8 mm. long.
Bracts narrowly elliptical ..... 38. *A. texana.*
Bracts broadly ovate ..... 42. *A. nudata.*
Stems glabrous.
Plant tall; fruit with distinct ridges; bracts acute ..... 43. *A. glaucescens.*
Plant low; fruit very slightly ridged or smooth; bracts obtuse ..... 30. *A. glabrifolia.*
Fruit turbinate, i. e., obpyramidal or obcordate in outline, winged.
Bracts lanceolate, attenuate.
Stems almost or quite glabrous; wings rather narrow and thick ..... 45. *A. lanceolata.*
Stems puberulent; wings broad and thin ..... 46. *A. mellifera.*

Bracts broadly ovate or obovate, acute or acutish.
Stems densely viscid-pubescent or hirsute-pubescent; bracts 10 to 15 mm. long.
Fruit narrow, almost twice as long as wide; stems hirsute ..... 40. *A. fendleri.*
Fruit about as broad as long; stems viscid-pubescent.
Blades of stem leaves elliptical; bracts broadly obovate, 12 to 15 mm. wide, rather obtuse ..... 35. *A. salsa.*
Blades of stem leaves lanceolate; bracts oval, acute, 6 or 7 mm. wide ..... 36. *A. fallax.*
Stems finely puberulent or glabrous; bracts 5 to 8 mm. long.
Leaf blades puberulent.
Wings of fruit with disks above ..... 29. *A. ramosa.*
Wings of fruit without disks above.
Leaves orbicular in outline ..... 33. *A. orbiculata.*
Leaves elliptical, ovate, or lanceolate .. 31. *A. pumila.*
Leaf blades glabrous.
Stems glabrous ..... 28. *A. glabra.*
Stems puberulent.
Branches from the base of the plant simple; bracts obtuse ..... 32. *A. elliptica.*
Stems branched; bracts acute ..... 34. *A. sparsifolia.*

1. **Abronia latifolia** Eschsch. Mem. Acad. Petersb. **5**: 271. 1826. FIGURE 49.

Abronia arenaria Menz.; Hook. Exot. Fl. **3**: *pl. 193.* 1827.

This is easily distinguished by its yellow flowers and orbicular leaves. The species is variable in several respects; the Oregon and Washington plants have broader leaves and thicker petioles than those from California; their fruit has wider wings, which are more often truncate above; and their bracts are frequently much wider than those of southern specimens. Heller's 3943 from Westport, Wash., is especially worthy of notice in these respects.

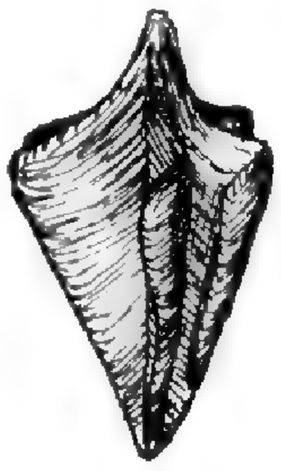


FIG. 49.—Fruit of *Abronia latifolia.* Scale 2.

This species ranges from Victoria, British Columbia, southward along the Pacific coast to Santa Barbara County, Cal. (Carpenteria).

2. **Abronia maritima** Nutt.; S. Wats. in Brewer & Wats. Bot. Cal. **2**: 4. 1880. FIGURE 50.

This species exhibits but little variation, and that mostly in the size of the fruit and the texture of the wings.

Ranges along the Pacific coast from Los Angeles County, Cal., southward through Lower California to the Territorio de Tepic, Mexico; also found on many of the islands off the southern Californian and Lower Californian coasts.

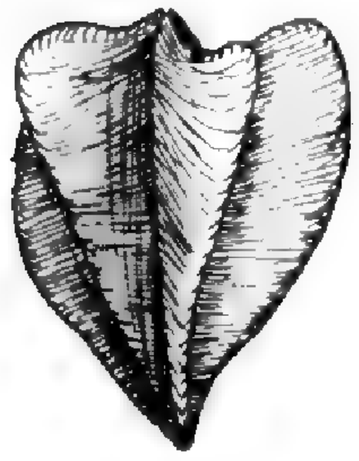


FIG. 50.—Fruit of *Abronia maritima.* Scale 2.

3. **Abronia insularis** Standley, sp. nov. PLATE XXVIII.

Perennial?; stems long and slender, perfectly glabrous except at the nodes, there minutely puberulent; leaf blades elliptical, obtuse, much narrowed at the base, glabrous, the opposite leaves unequal but of the same shape, 15 to 30 mm. long and 6 to 14 mm. wide; petioles as long as the blades or shorter, sparingly and very minutely puberulent; flowers many, 15 mm. long, their tubes sparingly puberulent; fruit about 10 mm. long and 12 mm. wide,

light yellowish-brown, the body indurated and depressed between the wings; wings 4, broad, 5 mm. wide above, much narrowed below, rounded above but not usually prolonged above the body, tough, thick, coriaceous, distinctly transversely veined.

A species to be separated from *A. umbellata* on account of its glabrous stems and the thick, coriaceous wings of the fruit; also of its internodes, which are very long, so that the plant does not appear at all leafy. Type U. S. National Herbarium no. 444666, collected on San Clemente Island off the coast of southern California, by Mrs. Blanche Trask, October, 1902 (no. 50). A younger plant from the same locality has slightly puberulent stems, leaves broader and orbicular or broadly elliptical, the petioles longer than the blades. I doubt if it is the same as the plant described above. Another specimen probably to be placed here is one collected at Santa Barbara, 1902, *Elmer* 3754.

EXPLANATION OF PLATE XXVIII.—*a*, Plant of *Abronia insularis*; *b*, fruit of same. *a*, Scale ½; *b*, scale 2.

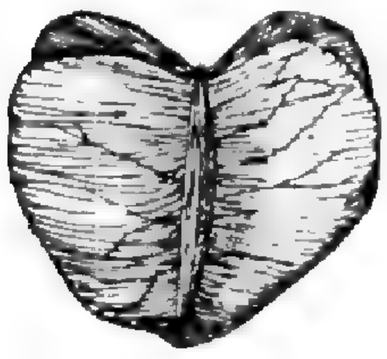


FIG. 51. — Fruit of *Abronia alba*. Scale 2.

4. **Abronia alba** Eastwood, Proc. Cal. Acad. III. 1: 97. 1898. FIGURE 51.

Abronia umbellata alba Jones, Contr. Western Bot. **10**: 45. 1902.

This species is distinguished by its white flowers. From *A. insularis* it can be separated by the thinner wings of its more puberulent fruit and by its shorter internodes and densely viscid-puberulent stem.

Specimens examined:

CALIFORNIA: On San Nicolas Island, April, 1897, *Mrs. Blanche Trask*, type collection.

5. **Abronia acutalata** Standley, sp. nov. PLATE XXIX, FIGURE 1.

Perennial ?; stems prostrate, puberulent; leaf blades elliptical, obtuse or acutish, attenuate at the base, 15 to 20 mm. long and 5 to 12 mm. wide, sparingly viscid-puberulent; petioles 10 to 25 mm. long, viscid-puberulent; bracts 4 or 5, lanceolate, acute, about 5 mm. long and 2 mm. wide, puberulent; flowers about 8, 10 mm. long, the limb 5 mm. wide, apparently of a brighter red than in *A. umbellata*, the tube with abundant fine, white pubescence; fruit about 10 mm. long and as wide, its wings very broad and thin, about 5 mm. wide, narrowed to the base of the body, spreading above and prolonged above the body of the fruit, acute above at the ends of the wings; beak of fruit very short.

This is distinguished from *A. umbellata* by its smaller flowers and by the prolonged, acute wings of the fruit; from *A. breviflora* it differs in the shape of the leaf blades and the characteristics of the fruit. Type in the Herbarium of the Missouri Botanical Garden, cotype National Herbarium no. 402105; collected in the Olympic Mountains, Clallam County, Washington, August, 1890, *Elmer* 2790.

EXPLANATION OF PLATE XXIX.—Fig. 1, *a*, plant of *Abronia acutalata*; *b*, fruit of same. Fig. 2, *a*, plant of *A. minor*; *b*, fruit of same. Figs. 1 and 2, *a*, scale ½; *b*, scale 2.

6. **Abronia breviflora** Standley, sp. nov. PLATE XXX.

Annual; stems spreading, slender, with very short and scanty viscid pubescence; leaf blades with a very few minute, scattered, glandular-viscid hairs, ovate, 20 to 25 mm. long and 15 to 19 mm. wide, acutish, broadly obtuse or truncate at the base; petioles puberulent, 20 to 30 mm. long; peduncles about 30 mm. long, with very short, fine, viscid pubescence; bracts 4 or 5, narrowly lanceolate, attenuate, 5 mm. long or less, less than 2 mm. wide, puberulent; flowers 10 to 12, about 10 mm. long; limb about 6 mm. wide, apparently of a rather bright red color, the tubes with a fine viscid pubescence longer than

ABRONIA INSULARIS STANDLEY.

ABRONIA ACUTALATA STANDLEY AND A. MINOR STANDLEY.

ABRONIA BREVIFLORA STANDLEY.

that of the peduncles; fruit about 8 mm. long and 4 mm. wide, tapering toward both ends and widest in the middle, very narrowly winged or exalate, the wings widest about the middle, puberulent.

Nearest *A. umbellata* and *A. acutalata;* differing from both in the form of the fruit, from the former, also, by its smaller flowers, which seem to be of a brighter color, and from the latter by the different shape of its leaves. Type U. S. National Herbarium no. 343656, cotype in the Herbarium of the Missouri Botanical Garden; collected at Mendocino, California, June, 1898, *H. E. Brown* 833; also same station, September 27, 1865, *Bolander.*

EXPLANATION OF PLATE XXX.—*a,* Plant of *Abronia breviflora; b,* fruit of same. *a,* Scale ½; *b,* scale 2.

7. **Abronia umbellata** Lam. Tabl. Encycl. **1:** 469. *pl. 105.* 1791. FIGURE 52.

This species has a glandular-pubescent stem; leaf blades ovate or elliptical, acutish at both ends; plant appearing leafy on account of the rather short internodes; flowers about 15 mm. long, the limb 7 mm. broad; bracts small, lanceolate, reddish; fruit about 10 mm. long and about as wide; its wings mostly 5, thin, much narrowed below and either truncate or tapering above, never rounded or prolonged above the body of the fruit; the outer fruits in the head sometimes tapering toward both ends and with slightly narrower wings.

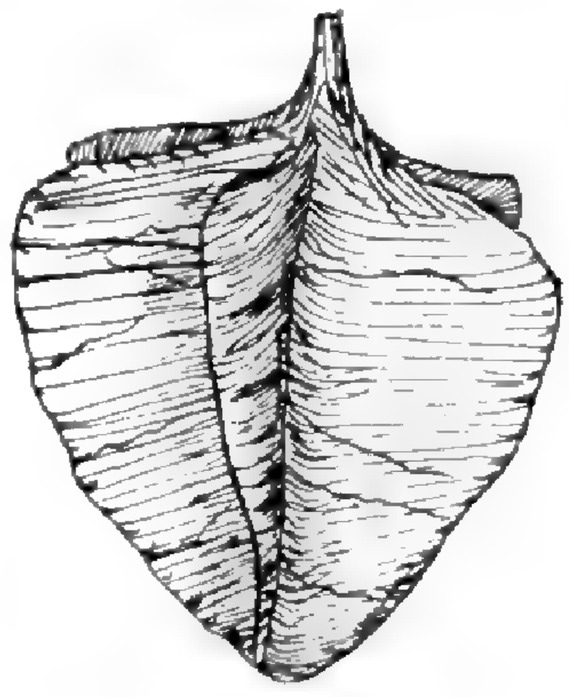


FIG. 52.—Fruit of *Abronia umbellata.* Scale 4.

Specimens examined:

CALIFORNIA: Pescadero, 1861, *F. Guirado* 696; Bay Farm Island, 1898, *Davy;* Pillar Point, 1902, *Baker* 1742; Point Pinos, 1903, *Heller* 6574; Monterey, 1899, *Brandegee;* Oxnard, 1901, *Davy* 7798; Monterey, 1891, *V. Bailey;* Santa Cruz, 1881, *Jones* 2276; San Francisco County, 1869, *Kellogg & Harford* 849; Pacific Grove, 1895, *Rutter* 208; Monterey, 1895, *Canby;* Point Pinos, 1891, *Michener & Bioletti;* Monterey, *M. E. B. Norton;* without locality, *Bridges* 291.

8. **Abronia minor** Standley, sp. nov. PLATE XXIX, FIGURE 2.

Perennial ?; stems spreading, very slender, almost or quite glabrous; leaf blades very narrowly elliptical or oblanceolate, glabrous, obtuse, gradually narrowed towards the base, 18 mm. long and 3 to 6 mm. wide; petioles shorter than the blades, glabrous; peduncles about 35 mm. long, glabrous or scantily and minutely puberulent; bracts 5, narrowly lanceolate, acuminate, puberulent, scarious, 7 mm. long and 2 mm. wide or less; flowers 12 to 15, 15 to 20 mm. long, limb 6 mm. wide, tubes puberulent; fruit broader than long, its body not coriaceous; the wings very broad, much narrowed below, produced above the body of the fruit; outer fruits with very narrow wings which are widest in the middle and narrowed above and below, the wings thin and soft.

This differs from *A. umbellata* in its more glabrous and slender stem, larger bracts, and narrower and more glabrous leaves, while the fruit has wider and thinner wings which are prolonged above the body. Type U. S. National Herbarium no. 23103, cotype in the Herbarium of the Missouri Botanical Garden; collected 25 miles northeast of San Luis Obispo, California, in 1876 by Palmer (no. 521).

Other specimens examined:

Fremont's Exped. to California, 1846; seashore in southern California, April, 1899, *Grant.*

EXPLANATION OF PLATE XXIX.—See under *Abronia acutalata,* p. 312.

9. **Abronia variabilis** Standley, sp. nov. PLATE XXXI, FIGURE 1.

Perennial, spreading; stems slender, almost glabrous below but puberulent above, especially at the nodes; leaf blades small, 9 to 15 mm. long and 6 to 12 mm. wide, very irregular in shape, usually irregularly rhomboidal, almost as broad as long, obtuse, cuneate at the base, more or less sinuate-margined, minutely puberulent; leaves few and not conspicuous, the internodes long; peduncles 5.5 to 6.5 cm. long, slender, sparsely puberulent; bracts ovate-lanceolate, 4 mm. long and 1 mm. wide, thick, acute; flowers almost 2 cm. long, their limbs 8 mm. wide, tubes sparsely puberulent; fruit small, about 6 mm. high and 8 mm. wide, its body firm and with vertical ribs between the wings; the wings broad, not narrowed below, rounded above but not prolonged above the beak, nerved, of medium thickness, rather thicker than those of *A. minor*, puberulent above.

This plant is nearest *A. minor*, but has broader, irregular leaves and longer petioles, while its fruit has narrower wings which are not so much narrowed at the base. From *A. umbellata* it may be distinguished by its more slender stems, irregular and smaller leaves, and broader bracts, and by the wings, which are more broadly rounded above. Type National Herbarium no. 465257, cotype in the Herbarium of the University of California; collected at Redondo, California, May 25, 1892, *Ernest Braunton* 258.

Other specimens examined:

CALIFORNIA: Redondo, 1904, *Grant;* Long Beach, 1900, *Jones* 6500; San Luis Obispo County, 1883, *Mrs. R. W. Summers;* Playa del Rey, 1902, *Abrams* 2494; Los Angeles County, 1890, *H. E. Hasse;* Coronado Beach, 1889, *Brandegee;* Los Angeles County, 1880, *E. A. Bush;* mouth of Tia Juana River, 1894, *Hearns* 3915.

EXPLANATION OF PLATE XXXI.—Fig. 1, *a*, plant of *Abronia variabilis; b*, fruit of same. Fig 2, *a*, plant of *A. sparsifolia; b*, fruit of same. Figs. 1 and 2, *a*, scale ½; *b*, scale 2.

10. **Abronia neurophylla** Standley, sp. nov. PLATE XXXII.

Perennial, prostrate; stem stout, minutely puberulent throughout but the stem appearing almost glabrous; internodes 10 cm. long or more; leaf blades large, 28 to 42 mm. long and almost as wide, very broadly ovate or rhomboidal, thick and fleshy, minutely puberulent beneath and on the margins, the midrib and lateral veins prominent, the opposite leaves of about the same size and shape; petioles as long as the blades, broad, densely viscid-puberulent, prominently nerved; peduncles about 12 cm. long, minutely puberulent, stout; bracts thick, ovate-lanceolate, acute, 8 mm. long, densely puberulent; flowers many, red, almost 2 cm. long, limb 9 mm. broad, tubes puberulent; fruit not seen.

This is distinguished by its prominently nerved, thick, fleshy leaves, and thick, strongly nerved petioles. The bracts are much thicker than those of *A. umbellata*, and the plant is larger, stouter, and much different in general appearance. Type U. S. National Herbarium no. 339934, collected on San Nicolas Island, California, April, 1897, by Mrs. Blanche Trask (no. 23). I have seen two sheets of this plant, one in the National Herbarium and one in the herbarium of Missouri Botanical Garden; neither specimen is very good, but the two taken together supply material enough for the diagnosis of the species. It is unfortunate that fruit is lacking, for it would probably help to differentiate the species still more definitely. The collector says of the plant: "Covering vast areas of drifted sand; leaves shining; flowers red and fragrant."

EXPLANATION OF PLATE XXXII.—Plant of *Abronia neurophylla*. Scale ½.

11. **Abronia platyphylla** Standley, sp. nov. PLATE XXXIII.

Perennial?; stems spreading, stout, viscid-puberulent or villous throughout; leaf blades orbicular to broadly elliptical, slightly sinuate-margined, puberulent

ABRONIA VARIABILIS STANDLEY AND A. SPARSIFOLIA STANDLEY.

ABRONIA NEUROPHYLLA STANDLEY.

ABRONIA PLATYPHYLLA STANDLEY.

throughout, obtuse, rounded or broadly cuneate at the base, 15 to 35 mm. long and 15 to 25 mm. wide; one of the opposite leaves large and broadly elliptical, the other as broad but shorter and orbicular; petioles almost or quite as long as the blades; peduncles stout, 5 or 6 cm. long, puberulent or villous; bracts 4 or 5, broadly lanceolate, 7 mm. long and 2.5 mm. wide, scarious, acute, densely viscid-puberulent; flowers about 20 mm. long, limb 8 to 10 mm. wide, tubes densely viscid-puberulent; fruit 8 mm. long and a little wider, whitish, the body with inconspicuous ribs between the wings, puberulent; wings 3 to 5, very broad, 5 to 7 mm. wide, thin and soft, rounded at the summit and prolonged above the body of the fruit, not much narrowed below.

Distinguished from *A. umbellata* by its broader and slightly sinuate leaves, its more scarious bracts, and its whiter fruit, the wings of which are much broader and less narrowed below as well as more prolonged above. From *A. gracilis* it differs in the thinner and much broader wings; in the shape of the fruit, which is broader than long; and in the leaves being less sinuate and the whole plant larger and stouter. From *A. variabilis* it is readily separated by its larger leaves, more pubescent stems and leaves, broader bracts, and larger flowers. Type in the herbarium of the University of California, collected at Del Mar, California, May 12, 1894, *Brandegee;* same, also, at San Diego, April 21, 1894, *Brandegee.*

EXPLANATION OF PLATE XXXIII.—*a*, Plant of *Abronia platyphylla;* *b*, fruit of same. *a*, Scale ½; *b*, scale 2.

12. Abronia gracilis Benth. Bot. Voy. Sulph. 44. 1844.

FIGURE 53.

This species can be determined by its annual root, strongly sinuate leaves, and large flowers, and by the characters of the fruit, which is 10 mm. long and almost as wide, with 4 or 5 broad wings, these thick and more or less coriaceous, light-colored, not prolonged above, and little narrowed below.

FIG. 53.—Fruit of *Abronia gracilis.* Scale 2.

Specimens examined:

LOWER CALIFORNIA: Magdalena Island, 1889, *Brandegee;* Abrejos Point, 1876, *Streets;* San Ramon, 1886, *Orcutt;* Magdalena Bay (type locality), *W. E. Bryant;* Calmalli, 1898, *Purpus* 81.

13. Abronia villosa S. Wats. Am. Nat. 7: 302. 1873. FIGURE 54.

Specimens examined:

FIG. 54.—Fruit of *Abronia villosa.* Scale 2.

NEVADA: 1872, *Lieut. Wheeler,* type collection; Vegas Wash, Lincoln County, 1891, *Coville & Funston* 425; Moapa, 1905, *Kennedy* 1101.

CALIFORNIA: San Felipe, 1898, *Purpus;* Colorado Desert, 1905, *Brandegee;* Temecula, 1887, *Cleveland* 740; near San Luis Obispo, 1876, *Palmer;* southeastern California, 1897, *Purpus* 5382; San Diego County, 1887, *Orcutt;* The Needles, 1884, *Jones* 3821; San Bernardino Mountains, 1894, *Parish* 3207; Antelope Valley, 1896, *Davy* 2214; Ash Hill, Mohave Desert, 1905, *Hall* 6101; Colorado Desert, 1903, *Abrams* 3224; Carrizo Creek, 1901, *Brandegee;* Fort Mohave, 1860–61, *Cooper.*

UTAH: St. George, 1869, *Palmer.*

ARIZONA: Yuma, 1881, *Vasey;* Beaver Dam Creek, 1902, *Goodding* 765.

14. **Abronia aurita** Abrams, Bull. Torr. Club **32**: 537. 1905. FIGURE 55.

This is much like *A. villosa*, but is a larger and stouter plant; its flowers are considerably larger, sometimes 3 cm. long; and its fruit is broader than long, the body thick and large, vertically ribbed, but with few or no transverse ribs, so that the fruit has not the pitted appearance of that of *A. villosa;* the wings very broad and usually elevated above the body of the fruit.

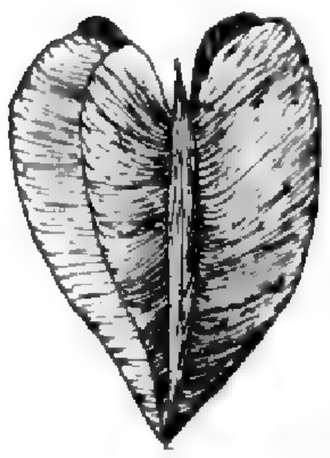


FIG. 55.—Fruit of *Abronia aurita*. Scale 2.

Specimens examined:

CALIFORNIA: Palm Springs, 1896, *Parish* 4138, type collection; San Jacinto Plains, 1882, *S. B. & W. F. Parish* 1156; San Jacinto, 1892, *Hasse;* near San Jacinto, 1898, *Leibery* 3119; San Jacinto Mountain, 1897, *Hall* 769; Winchester, *Hall* 2915; Temecula, 1888, *Vasey* 514; San Jacinto, 1890, *Mrs. Gregory.*

15. **Abronia pinetorum** Abrams, Bull. Torr. Club **32**: 537. 1905. FIGURE 56.

This differs from *A. aurita* in its differently shaped wings and rather wider bracts, its somewhat smaller and thicker leaves, and its more slender and less pubescent perianth tubes, and in the smaller size of the plant.

FIG. 56.—Fruit of *Abronia pinetorum*. Scale 2.

Specimens examined:

CALIFORNIA: Thomas Valley, San Jacinto Mountains, 1901, *Hall* 2166, type collection.

16. **Abronia pogonantha** Heimerl, Engl. Bot. Jahrb. **11**: 87. *pl. 2.* 1889. FIGURE 57.

Abronia angulata Jones, Contr. Western Bot. **8**: 39. 1898.

This plant can be distinguished from all other species of the genus by its peculiar fruit, which has but two wings. The fruit is smaller than in most species, being about 4 mm. long, and is obcordate in outline.

FIG. 57.—Fruit of *Abronia pogonantha*. Scale 2.

Specimens examined:

CALIFORNIA: Mohave River, 1882, *Parish* 1345, type collection; Lancaster, 1902, *Elmer* 3663; Argus Mountains, 1897, *Purpus* 5379; near Bakersfield, 1891, *Coville & Funston* 1239; Mohave River at Burcham's ranch, 1901, *Parish* 4995; Darwin Mesa, Argus Mountains, 1897, *Jones*, type of *A. angulata;* Mohave Desert, 1895, *Parish* 3775; near Hesperia, 1892, *Parish* 2453; Antelope Valley, 1896, *Dary* 2214; Hesperia, 1892, *Trelease.*

17. **Abronia alpina** Brandeg. Bot. Gaz. **27**: 456. 1899. FIGURE 58.

This is quite distinct from all other Abronias by the small size of the plant, its small orbicular leaves, their long petioles, the few flowers in each head, and the exalate fruit. It may be merely a depauperate form of *A. villosa.*

FIG. 58.—Fruit of *Abronia alpina*. Scale 4.

Specimens examined:

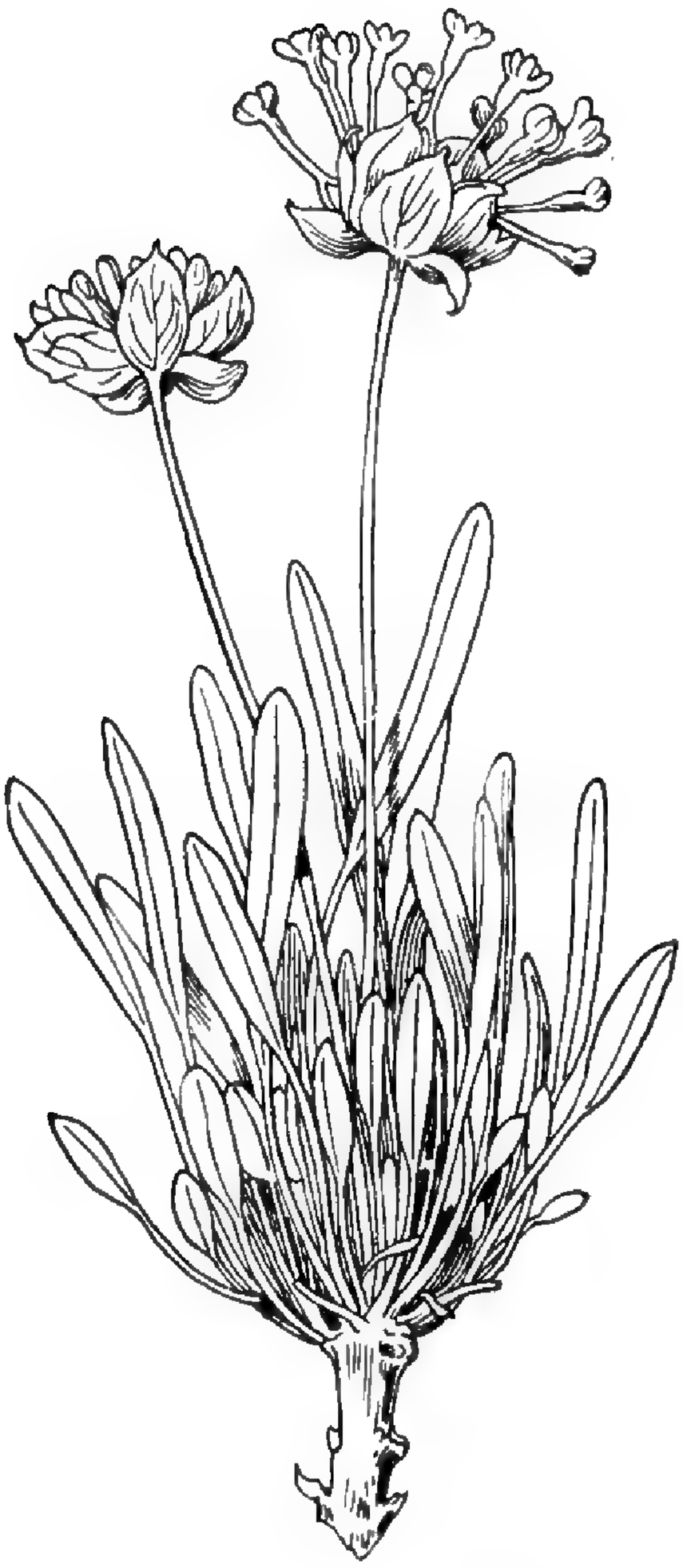
CALIFORNIA: Monatchy Meadows, Mount Whitney, *Purpus* 1877, type.

18. **Abronia covillei** Heimerl, Smithson. Misc. Coll. **52**: 197. 1908.[a] PLATE XXXIV.

A perennial plant, cespitose, forming dense, leafy clumps which are 10 to 15 cm. wide; root stout, about 1 cm. thick above; stems many rising from the

[a] The descriptions of this and *A. bigelovii* were translated by the author from Latin descriptions furnished by Doctor Heimerl, which are published in their original form in the Smithsonian Miscellaneous Collections as here cited.

ABRONIA COVILLEI HEIMERL.



ABRONIA BIGELOVII HEIMERL.

top of the root, woody, the branches interlaced, procumbent, much shortened, about 3 or 4 cm. long, bearing fascicles of leaves and pedunculate heads of flowers, the aspect of the plant being very much like that of *A. nana;* leaves radical (in appearance only), small; blades shortly ovate, subtruncate at the base or obtuse or slightly cordate, 7 to 13 mm. long and 5 to 9 mm. wide, abruptly contracted into a petiole 10 to 30 mm. long, at the apex very obtuse to rounded, thickish, of the same color on both surfaces, light-green, subentire or somewhat undulate, very minutely pulverulent-puberulent with very short, spreading, eglandulose, rather abundant hairs, the lateral nerves fine and few (2 or 3); peduncles 17 to 24 mm. long, slender, erect, more or less reddish, hirtellous above with more or less unequal, minute hairs, the pubescence being like that of the leaves only more conspicuous; heads of flowers rather small, about 2 cm. broad, each composed of 6 to 12 flowers, the flowers rather erect; bracts few (usually only 4 to 6) and membranaceous, lanceolate, about 6 mm. long and 2 mm. wide, rather acute to somewhat acuminate, greenish-white, densely and finely puberulent; flowers small, about 11 mm. long; ovary subturbinate, 2.5 mm. long and 2 mm. wide, with 5 prominent angles, puberulent (the glabrate base excepted) with rather long and puberulent, eglandulose hairs; tube of the perianth 1 mm. wide below, slightly and gradually dilated above to 1.5 mm., greenish, finely and sparingly puberulent above, the pubescence being a little more dense below; limb about 8 mm. wide (white?), deeply divided with obcordate lobes which are emarginate for about half their length; stamens 5 to 7, the anthers a little more than 1 mm. long; pistil 6 mm. long, the stigma about 1.5 mm. long; fruit not present in the specimens.

Fine specimens were collected in California in the Inyo Mountains in Inyo County by Coville & Funston, Death Valley Expedition, no. 1782, distributed as *A. nana.* Type in the National Herbarium.

The plant differs from *A. nana* in its very minute pubescence which is not glandular and its ovate leaves, in having lanceolate bracts which are not scarious and are smaller than in that species, and in its smaller flowers.

EXPLANATION OF PLATE XXXIV.—Plant of *Abronia covillei.* Natural size. Drawing by W. Liepoldt.

19. Abronia nana S. Wats. Proc. Am. Acad. **14**: 294. 1870.

Specimens examined:

UTAH: Pahreah, 1894, *Jones* 5291a.

NEVADA: Highland Peak, 1898, *Purpus* 6431, 6278; Mormon Mountains, 1906, *Kennedy & Goodding.*

ARIZONA: Grand Canyon, 1884, *Lemmon.*

CALIFORNIA: San Bernardino Mountains, 1894, *Parish* 3046.

19a. **Abronia nana lanciformis** Jones. Contr. Western Bot. **11**: 2. 1903.

This differs slightly from the species in the rather narrower bracts and narrow, oval, acute leaves which have a tapering, acutish base.

Specimens examined:

ARIZONA: Hackberry, 1884, *Jones* 4689, type collection; Peach Springs, 1884, *Jones.*

20. Abronia bigelovii Heimerl, Smithson. Misc. Coll. **53**: 197. 1908.[a]

PLATE XXXV.

A perennial plant with a shortened, woody stem which bears at the top a dense fascicle of leaves and a long-peduncled head of flowers like *A. nana;*

[a] See footnote, page 316.

leaves all basal, very distinct in shape, linear-oblong to linear, rather obtuse to very obtuse at the apex, gradually cuneately narrowed into a petiole, the blade and petiole together being about 34 mm. long and 3.5 to 4 mm. wide; petiole equaling or noticeably surpassing the blade, usually gradually widening into it, rather wide, whitish, somewhat puberulent; the blade of the same color on both surfaces, grayish-green, entire, at first very finely eglandulose-puberulent but finally glabrous, the midrib distinct, especially toward the base, the lateral nerves inconspicuous; peduncles 5 to 7 cm. long, slender, erect, angled in the dried state, pulverulent-puberulent with eglandulose hairs, these very short, moderately dense below and more dense above; heads (only those which have finished flowering are present on the specimens) with numerous flowers; the bracts like those of *A. fragrans*, membranaceous, broadly ovate to ovate-elliptical, shortly acuminate, acutish, about 8 mm. long and 5 mm. wide, sparingly pulverulent-puberulent; perianths densely puberulent; fruits apparently like those of *A. turbinata*.

Collected by Dr. J. M. Bigelow "near Galisteo"[a] in an expedition made in the year 1853 (Lieutenant Whipple's Exploration for a Railway Route from the Mississippi River to the Pacific Ocean, near the thirty-fifth parallel of latitude in 1853–54). Type in the National Herbarium.

EXPLANATION OF PLATE XXXV.—Plant of *Abronia bigelorii*. Natural size. Drawing by W. Liepoldt.

21. **Abronia exalata** Standley, sp. nov. PLATE XXXVI, FIGURE 1.

Annual; stems ascending, 20 to 40 cm. long, minutely glandular, slender; leaf blades broadly ovate to elliptical and deltoid-ovate, obtuse, truncate at the base, 13 to 26 mm. long and 12 to 25 mm. broad, almost or quite glabrous; petioles slightly shorter than the blades, glandular; peduncles slender, longer than the leaves; bracts broadly elliptical or obovate, obtuse, some of them short-mucronate, about 4 mm. long and 3 mm. wide; flowers 1 cm. long, seldom longer, their tubes densely pubescent; fruit small, 3 mm. long and 1.5 mm. thick, not winged, its body smooth or slightly ridged, rounded or tapering above, puberulent.

This is nearest *A. turbinata*, from which it can be distinguished by its broader, obtuse bracts, its smaller fruit which is not winged but merely slightly ridged or more frequently smooth, and its smaller flowers. The plant itself is as large as plants of *A. turbinata* and does not seem at all depauperate. Type U. S. National Herbarium no. 23087, collected near Keeler, Inyo County, Cal., at an altitude of 1,100 meters, May 14, 1891, *Coville & Funston* 845.

Other specimens examined:

CALIFORNIA: North Fork of Kern River, 1888, *Palmer* 125.

NEVADA: Belleville, 1882, *Shockley* 267.

EXPLANATION OF PLATE XXXVI.—Fig. 1, *a*, plant of *Abronia exalata*; *b*, *c*, fruits of same. Fig. 2, fruit of *A. turbinata*. Fig. 1, *a*, scale ½; fig. 1, *b*, *c*, fig. 2, scale 2.

22. **Abronia turbinata** Torr.; S. Wats. Bot. King Explor. 285. *pl. 31.* 1871.

PLATE XXXVI, FIGURE 2.

Annual; stems puberulent; leaf blades glabrous, broadly elliptical, bright green; bracts lanceolate, acute or acuminate, 10 mm. or less in length; flowers about 18 mm. long, their tubes greenish, limb greenish-white or pinkish; fruit 7 mm. long and about as wide, truncate above, obpyramidal in outline, hispidulous at the summit; wings prominent, much wrinkled, with prominent vertical nerves; outer fruits sometimes narrowed above into a stout beak.

[a] In northern New Mexico south of Santa Fe.

ABRONIA EXALATA STANDLEY AND A. TURBINATA TORR.

ABRONIA ARIZONICA STANDLEY AND A. LOBATIFOLIA STANDLEY.

Specimens examined:

NEVADA: Hot Spring Butte, Humboldt County, *Watson*, type collection; Hawthorn, 1882, *Jones* 4039; Goldfield, *Shockley* 149; Pyramid Lake, 1906, *Frandsen & Brown;* Wadsworth, 1897, *F. H. Hillman;* Pyramid Lake, 1905, *Kennedy* 1016; Wadsworth, 1897, *Jones*.

CALIFORNIA: Deep Spring Valley, 1898, *Purpus* 5822; near Bishop, 1906, *Heller* 8346.

OREGON: Alvord Desert, 1896, *Leiberg* 2428; Alvord Desert, 1901, *Cusick* 2592.

EXPLANATION OF PLATE XXXVI. See under preceding species.

23. **Abronia arizonica** Standley, sp. nov. PLATE XXXVII, FIGURE 1.

Annual; prostrate or ascending: stems stout, almost glabrous, except at the nodes, there sparingly pubescent; leaf blades deltoid-ovate, semicordate or truncate at the base, narrowed above to the obtuse apex, glabrous, or minutely and sparingly puberulent on the lower surface; petioles as long as the blades or those of the upper leaves shorter; peduncles about 4 cm. long, almost glabrous; bracts 10 to 12 mm. long and 2 to 2.5 mm. wide, lanceolate, acute, sparingly puberulent; flowers about 12 in each head, 15 mm. long, red; fruit 8 mm. long and 9 mm. wide, with several thin wings, these considerably narrowed below and sloping slightly above from the beak, not rising above it; outer fruits irregular, with wings very narrow or wanting, sometimes biturbinate.

From *A. torreyi*, to which this is most closely related, it may be separated by its larger bracts, broader and more glabrous leaves, almost glabrous stem, and wings without disks above; from *A. lobatifolia* it is distinguished by its different leaves, more glabrous stem, and larger bracts.

Type U. S. National Herbarium no. 23094, collected in Arizona by Vasey, October, 1882.

EXPLANATION OF PLATE XXXVII.—Fig. 1, *a*, plant of *Abronia arizonica; b*, fruit of same. Fig. 2, *a*, plant of *A. lobatifolia; b*, fruit of same. Figs. 1 and 2, *a*, scale ½; *b*, scale 2.

24. **Abronia lobatifolia** Standley, sp. nov. PLATE XXXVII, FIGURE 2.

Annual; prostrate; stems branched, puberulent throughout but not viscid, stout; leaf blades puberulent, irregularly ovate, truncate or rounded at the base, acutish above, mostly with two rounded lobes, one on each side a little above the middle of the blade; petioles almost as long as the blades; peduncles short, 2 or 3 cm. long; bracts linear, 10 to 13 mm. long and 1.5 mm. wide, attenuate, ciliolate-margined, puberulent; flowers numerous, about 15 mm. long, red; fruit very light-colored, 7 mm. long and 5 or 6 mm. wide, with 4 or 5 double but very thin wings, these much narrowed below and rounded above to the beak, but not rising above it, scarcely veined, hispidulous above.

Differing from *A. turbinata* in habit, shape of leaves, color of flowers, and form of fruit; from *A. torreyi* in its lobed leaves and narrower bracts, and in the wings of the fruit, which are mostly without disks above, and are less veined and thinner. Type U. S. National Herbarium no. 23098, collected in Arizona in 1869 by Palmer.

This was designated by Doctor Heimerl in herbarium as a variety of *A. turbinata* under the name here taken up.

EXPLANATION OF PLATE.—See under preceding species.

25. **Abronia torreyi** Standley, sp. nov. PLATE XXXVIII.

Annual; stems prostrate, 10 to 50 cm. long, rather stout, covered with a fine close pubescence; internodes short, 4 or 5 cm. long, the joints swollen; leaf

blades ovate or deltoid-ovate, 20 to 40 mm. long and 10 to 25 mm. wide, obtuse or acutish at the apex, the base varying, unequal, semicordate, rounded, truncate, or broadly cuneate, very minutely and sparsely puberulent; petioles as long as the blades or longer, pubescent; peduncles longer than the leaves; bracts narrowly lanceolate, acuminate, 8 mm. long and 1.5 mm. wide, puberulent, ciliolate; flowers 15 to 18 mm. long, bright purplish-red, the tubes viscid-pubescent; fruit 7 mm. long and 5 or 6 mm. wide, hispidulous, with a short, narrow beak, which is usually depressed below the wings; wings narrow, thin, their corners rounded above, surmounted by conspicuous flat disks; seed 2 to 2.5 mm. long, lanceolate in outline, black, smooth.

This plant can be separated from *A. angustifolia*, its nearest relative, by its smaller, narrower seed, broader leaves which are not attenuate at the base, and more densely pubescent stem. Type U. S. National Herbarium no. 330234, collected at Mesilla, Donna Ana County, New Mexico, June 15, 1897, *Wooton* 11. The plant is very common on the sandhills of the Mesilla Valley, flowering from early spring until late in autumn. It has been confused with *A. turbinata*, from which it can readily be distinguished by its prostrate habit and red flowers. The fruit is distinct, also, and the general appearance of the plant is very different. I have little doubt that this is the plant to which Doctor Torrey originally applied the name *A. turbinata*. Doctor Watson, however, in publishing the description had in mind another plant, one from Nevada which he himself had collected and which he took to be the same as Doctor Torrey's. It is the Nevada plant which is figured in the plate accompanying the original description of *A. turbinata*, and which is accordingly to be taken as the type, although Doctor Watson also mentions several plants which are to be placed rather in *A. torreyi*.

Additional specimens examined:

NEW MEXICO: Camp 2, Emory's 55th monument, 1892, *Mearns* 165; Mexican Boundary Survey 1120; Mesilla Valley, 1904, *Wooton*, and numerous other collections from the same locality.

TEXAS: *Wright* 1710 and 601; El Paso, 1881, *Vasey;* El Paso, 1884, *Jones* 3706; El Paso, 1893, *Mearns* 1486.

CHIHUAHUA: Paso del Norte (Ciudad Juarez), 1885, *Pringle* 77; Juarez, 1901, *Pringle* 9465; sandhills below El Paso, 1846, *Wislizenus* 93; Ciudad Juarez, 1905, *Purpus*.

EXPLANATION OF PLATE XXXVIII.—*a*, Plant of *Abronia torreyi;* *b*, fruit of same. *a*, Scale ½; *b*, scale 2.

26. Abronia angustifolia Greene, Pittonia **3**: 344. 1898.

Abronia turbinata forma *stenophylla* Heimerl, Ann. Cons. et Jard. Genev. 5: 190. 1901.

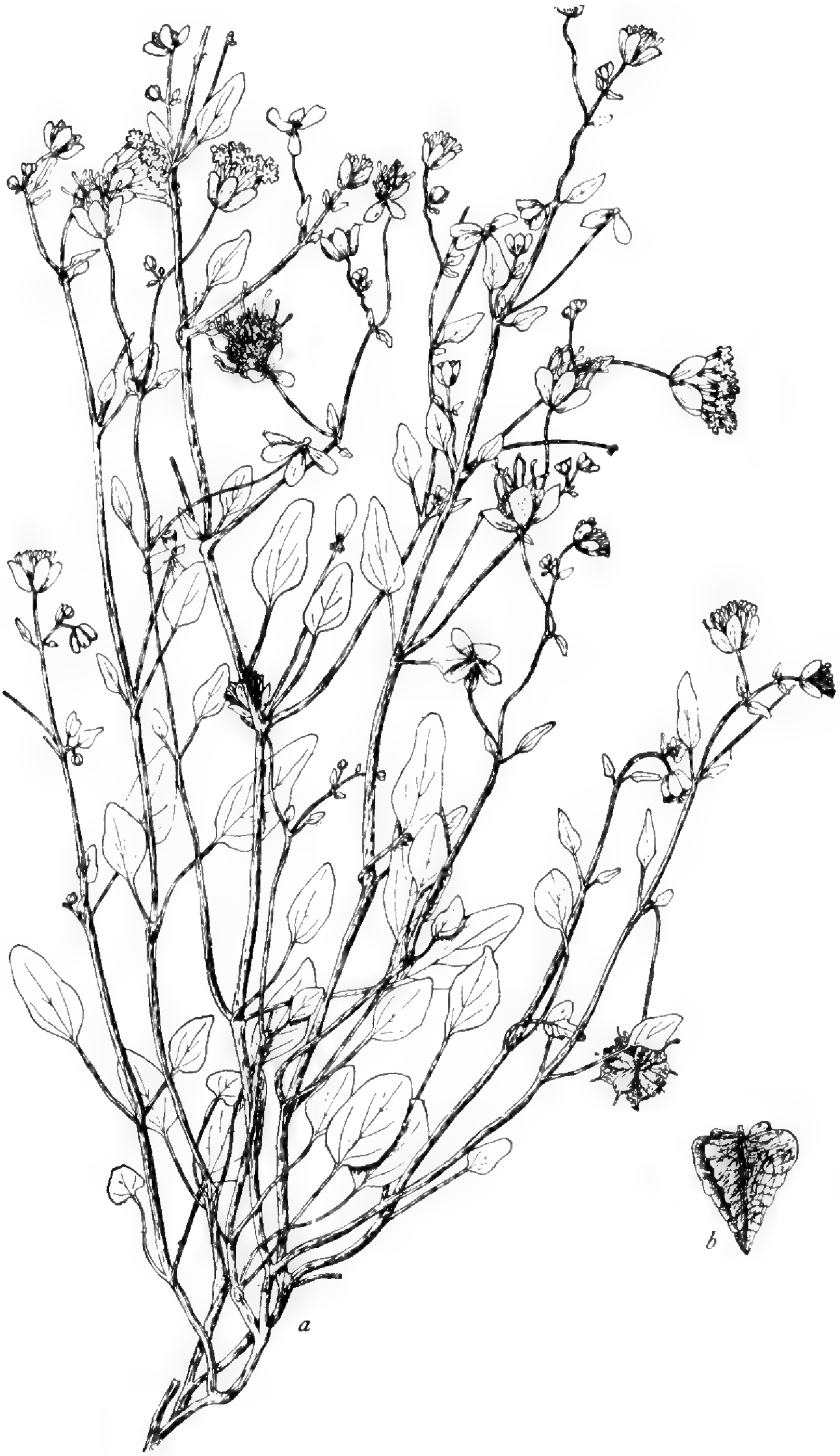
Abronia angustifolia is much like *A. torreyi;* its leaves, however, are lanceolate, narrowly cuneate at the base; stems minutely puberulent; flowers 15 mm. long; seed 1.5 mm. or less in length, ovate in outline.

Specimens examined:

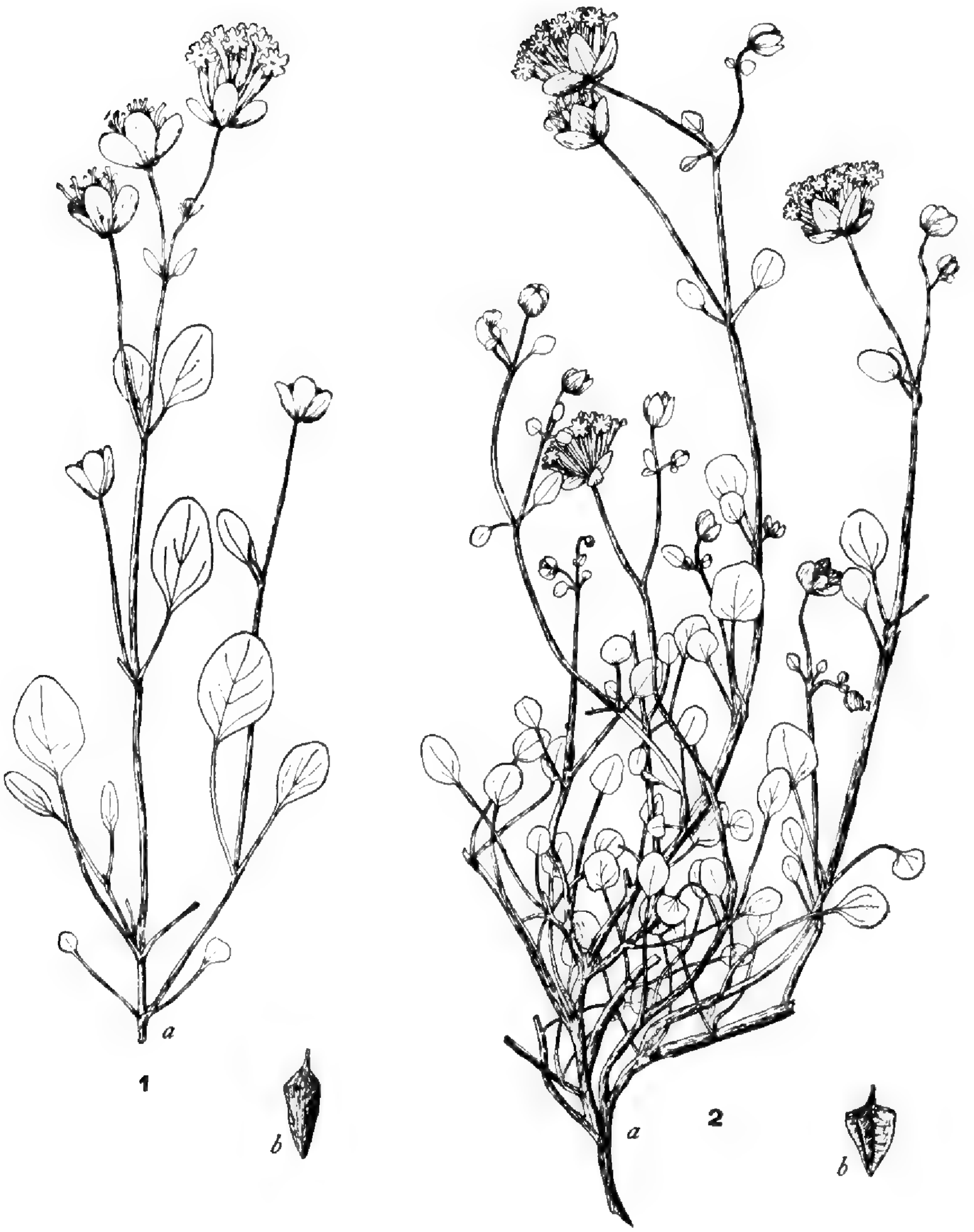
NEW MEXICO: White Sands, 1897, *Wooton* 157, type, and several other collections from the same locality by the same collector.

This is one of the rather few plants that grow upon the great dunes of pure white gypsum sand which occur in eastern Donna Ana County. White-flowered specimens are occasionally found. The White Sands are separated by a high range of mountains from the nearest locality at which *A. torreyi* occurs, the valley of the Rio Grande 40 miles to the west.

ABRONIA TORREYI STANDLEY.



ABRONIA RAMOSA STANDLEY.



ABRONIA GLABRIFOLIA STANDLEY AND A. ORBICULATA STANDLEY.

27. **Abronia carletoni** Coult. & Fisher, Bot. Gaz. **17**: 349. 1892.

Abronia turbinata carletoni Jones, Contr. Western Bot. **10**: 44. 1902.

I have not seen the type of this species which is in the herbarium of the University of Chicago, now deposited with the Field Museum of Natural History; Doctor Millspaugh, however, was kind enough to send a full-sized photograph of the specimen which shows the characteristics of the plant almost as well as the specimen itself could do. It is not the same as *A. angustifolia*, as Mr. Jones claims, but seems to me much nearer *A. fragrans*. The bracts are elliptical or obovate, acute, scarious, about 5 mm. long, the plant slender, the leaf blades 1 to 3 cm. long, oblanceolate, acutish at the apex. Type collected in eastern Colorado in 1891, *M. A. Carleton* 459; apparently not since collected.

28. **Abronia glabra** Rydb. Bull. Torr. Club **29**: 685. 1902. FIGURE 59.

Specimens examined:

COLORADO: Grand Junction, 1883, *Jones*, type; hills near Grand Junction, 1900, *S. G. Stokes*.

This is very closely related to *A. elliptica* and perhaps hardly separable.

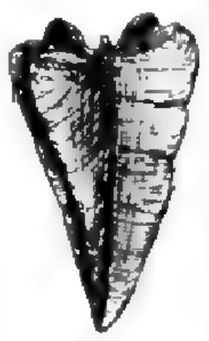


FIG 59.—Fruit of *Abronia glabra*. Scale 2.

29. **Abronia ramosa** Standley, sp. nov. PLATE XXXIX.

Perennial; stems ascending, slender, about 30 cm. high, pale, much-branched, minutely puberulent throughout but not viscid: leaf blades thick, minutely puberulent on both surfaces, elliptical, oblique at the base, obtuse; petioles as long as the blades or longer; peduncles densely puberulent, 2 to 4 cm. long; bracts obovate, 1 cm. long, obtuse; flowers 12 mm. long, their tubes densely puberulent; fruit cuneate-obpyramidal in outline, with 5 thin double wings; these closely veined, much narrowed below, truncate above, and surmounted by conspicuous flat disks, minutely puberulent.

This is nearest *A. elliptica* and *A. glabra*. From the former it differs in its branched stem and smaller flowers and in the wings of the fruit, which are surmounted by disks; from the latter, in its puberulent stem, larger obtuse bracts, and the slightly different fruit. Type U. S. National Herbarium no. 410003, collected at Holbrook, Arizona, June 16, 1901, by L. F. Ward.

Other specimens examined:

ARIZONA: Holbrook, 1896, *Myrtle Zuck;* Moki Reservation, 1896, *Hough* 16a; Carrizo, 1892, *Wooton;* Woodruff, 1892, *Wooton*.

EXPLANATION OF PLATE XXXIX.—*a*, Plant of *Abronia ramosa; b*, fruit of same. *a*, Scale ½; *b*, scale 2.

30. **Abronia glabrifolia** Standley, sp. nov. PLATE XL, FIGURE 1.

Stems erect, slender, branched, few-leaved, glabrous; leaf blades broadly elliptical, rounded at both ends, thick and fleshy, glabrous; petioles as long as the blades or longer; peduncles 4 cm. long or less, slender; bracts broadly elliptical to obovate, scarious, obtuse, 10 to 12 mm. long and 7 or 8 mm. wide; flowers 15 mm. long, their tubes glabrous; fruit 5 or 6 mm. long and 2 mm. in diameter, clavate or cylindrical in form, not at all winged or ridged, but smooth, acute or obtuse above, not at all angled, glabrous.

This can be distinguished from any other species of Abronia by its smooth and glabrous fruit; otherwise it is much like *A. elliptica*, except for its more branched stem. Type in the herbarium of the University of California, collected in Colorado in 1878, "ex herb. Wm. F. Flint."

EXPLANATION OF PLATE XL.—Fig. 1, *a*, plant of *Abronia glabrifolia; b*, fruit of same. Fig. 2, *a*, plant of *A. orbiculata; b*, fruit of same. Figs. 1 and 2, *a*, scale ½; *b*, scale 2.

31. **Abronia pumila** Rydb. Bull. Torr. Club **29**: 683. 1902.

Specimens examined:

UTAH: Emery, 1894, *Jones* 5445q; 6 miles up Salida Canyon, 1894, *Jones* 5416a, types.

32. **Abronia elliptica** A. Nelson, Bull. Torr. Club **26**: 7. 1899. FIGURE 60.

Abronia bakeri Greene, Plantae Bakerianae **3**: 32. 1901.

Abronia fragrans elliptica Jones, Contr. Western Bot. **11**: 3. 1903.

FIG 60.—Fruit of *Abronia elliptica*. Scale 2.

This plant has numerous glabrous or puberulent stems from a woody base; the bracts usually have a reddish or purplish tinge below, which is characteristic of this species alone; the stems also have a peculiar reddish tinge or are sometimes glaucous.

Specimens examined:

WYOMING: Green River, 1897, *A. Nelson* 3021, type; Fort Steele, 1901, *Tweedy* 4615; Medicine Bow River, 1898, *E. Nelson* 4398; Bates Creek, 1901, *Goodding* 196; Sheep Creek, 1899, *Charles Schuchert;* Cummins, 1895, *A. Nelson* 1475.

UTAH: Diamond Valley, 1902, *Goodding* 822; Modena, 1902, 1006.

COLORADO: Deer Run, 1901, *Baker* 89; Grand Junction, 1901, *Baker* 92; Rifle, Garfield County, 1900, *Osterhout* 2131; Grand Junction, 1891, *Eastwood.*

33. **Abronia orbiculata** Standley, sp. nov. PLATE XL, FIGURE 2.

Perennial, much branched from the base; stems ascending, 25 cm. high, glandular-puberulent throughout; leaf blades orbicular or very broadly elliptical, rounded at both ends, thick, glandular-puberulent throughout; petioles mostly much longer than the blades; peduncles 35 to 50 mm. long, sparingly puberulent; bracts 5, elliptical, scarious, obtuse; flowers scarcely more than 10 mm. long, their tubes sparingly puberulent or glabrous; fruit turbinate, 5 mm. long and 3 mm. wide, with narrow thin wings, these truncate above or slightly rounded, the fruit thus either obpyramidal or obcordate in outline.

Nearest *A. elliptica*, from which it is distinguished by its thicker, orbicular leaves, its smaller flowers, and its viscid-puberulent stem. From *A. pumila* it differs chiefly in the shape of the leaves and the larger obtuse bracts. Type U. S. National Herbarium no. 23045, collected at Cottonwood Springs, Vegas Valley, Nevada, April 30, 1891, Vernon Bailey, 1886.

EXPLANATION OF PLATE XL.—See under *Abronia glabrifolia*, p. 321.

34. **Abronia sparsifolia** Standley, sp. nov. PLATE XXXI, FIGURE 2.

Annual; stems erect, slender, branched, glaucescent, minutely glandular-pubescent above; internodes rather long; leaf blades ovate, the lower ones broadly so, obtuse, thick, glaucous beneath, glabrous; bases of the lower leaves semicordate, of the upper ones rounded, the uppermost blades more or less puberulent; petioles of the lower leaves much longer than the blades, those of the upper ones shorter; peduncles 2 to 4 cm. long, granular-puberulent, divaricate; bracts elliptical or narrowly obovate, acutish, 10 mm. long and 4 or 5 mm. wide, puberulent, scarious; flowers numerous, 15 mm. long, their tubes glandular-puberulent; fruit obpyramidal in outline, 5 mm. long and about as wide, with several wide, thin, double wings which are rounded or truncate above.

From *A. elliptica* this can be distinguished by its narrow, acutish bracts, broader leaves, and more branched stem; from *A. fallax* by its broader and glaucous leaves, less leafy stems, and more slender habit. Type in the her-

PLATE XLI.

ABRONIA NEALLEYI STANDLEY AND A. TEXANA STANDLEY.

barium of the University of California, cotype in the National Herbarium; collected at Quartz Spring, Mount Irish, Nevada, altitude 1,530 to 1,880 meters, 1898, *Purpus* 6325.

EXPLANATION OF PLATE XXXI.—See under *Abronia variabilis*, p. 314.

35. **Abronia salsa** Rydb. Bull. Torr. Club **29**: 684. 1902. FIGURE 61.

Abronia fragrans pterocarpa Jones, Contr. Western Bot. **11**: 3. 1903.

Specimens examined:

UTAH: Salt Lake City, 1869, *Watson* 965, type collection; Great Salt Lake, 1871, *Hayden;* Marysville, 1894, *Jones* 5355w; Silver Reef, 1894, *Jones* 5149aj; Springdale, 1894, *Jones* 5261u; Garfield County, 1883, *A. L. Siler;* Kanab, 1894, *Jones* 5286z; Garfield Beach, *Rydberg & Carleton* 6895.

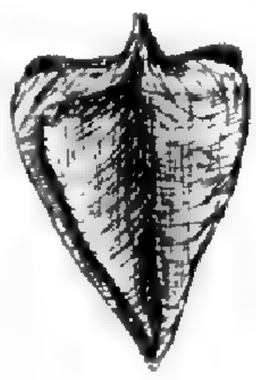


FIG. 61.—Fruit of *Abronia salsa*. Scale 2.

36. **Abronia fallax** Heimerl, Bull. Torr. Club **29**: 684. 1902. FIGURE 62.

I have seen no specimens besides the type that could be referred here. The plant differs from *A. salsa*, which it most resembles, in its narrower, lanceolate leaves, more densely leafy stem, smaller bracts, and slightly different fruit.

The type is from Salt Lake City, Utah, 1879, *Jones* 1337.

FIG. 62.—Fruit of *Abronia fallax*. Scale 2.

37. **Abronia nealleyi** Standley, sp. nov. PLATE XLI, FIGURE 1.

Perennial; stems erect, branching from the base, 15 cm. high, rather densely puberulent throughout; leaf blades thick, lanceolate or narrowly elliptical, 20 to 25 mm. long and 5 to 9 mm. wide, rather obtuse at the apex, cuneate at the base, glabrous except the veins, these puberulent; petioles as long as the blades or shorter; peduncles 25 to 45 mm. long, densely puberulent; bracts scarious, broadly ovate, acute, 4 to 6 mm. long and 3 mm. wide; flowers 12 mm. long, numerous, their tubes puberulent; fruit biturbinate, broadest about one-third below the summit, 4 mm. long and almost as wide, narrowly ridged.

This is a very distinct species because of its small bracts, narrow leaves, small fruit and flowers, and low habit; the plant appears to be vigorous and not at all like a depauperate form. Type in the herbarium of the Missouri Botanical Garden, collected at Screw Bean, Reeves County, Texas, in 1893, by G. C. Nealley. In the National Herbarium there is another plant, collected October, 1881, in Texas by Havard, that should probably be placed here. One collected by Havard at Odessa Tank, September, 1881, with the habit and general appearance of *A. nealleyi*, but the fruit with prominent wings and not biturbinate, is probably of an undescribed species, but the material is insufficient for determination.

EXPLANATION OF PLATE XLI.—Fig. 1, *a*, plant of *Abronia nealleyi; b*, fruit of same. Fig. 2, *a*, plant of *A. texana; b*, fruit of same. Figs. 1 and 2, *a*, scale ½; *b*, scale 2.

38. **Abronia texana** Standley, sp. nov. PLATE XLI, FIGURE 2.

Perennial; stems slender, ascending; plant rather more leafy than *A. fragrans*, i. e., the internodes shorter; stems very sparingly puberulent, almost glabrous below; leaf blades ovate, obtuse or acutish at the apex, semicordate, truncate, or rounded at the base, glabrous; petioles mostly shorter than the blades, sparsely puberulent; peduncles slightly puberulent, 7 or 8 cm. long; bracts elliptical, 6 or 7 mm. long and 4 mm. wide, acute; flowers mostly 15 mm. long; fruit biturbinate, about 7 mm. long and 3 mm. wide, with very narrow wings or ridges, these widest a little above the middle; outer fruits more strongly biturbinate than the inner ones; minutely puberulent above.

I have separated this plant from *A. fragrans* because of its less erect habit, more glabrous leaves inclined to be semicordate at the base, rather smaller flowers, and much smaller and narrower bracts. Some of the plants referred here have much narrower bracts than the type, often narrowly lanceolate. Type U. S. National Herbarium no. 501296; cotype in the herbarium of the Missouri Botanical Garden: collected "on sands" at Estelline, Texas, May 25, 1904, *Reverchon* 4282.

Other specimens examined:

TEXAS: Mitchell County, 1882, *Reverchon* 1345; Big Springs, 1903, *Tracy* 8073; Wichita County, 1880, *J. Ball;* Estelline, 1903, *Reverchon* 3686a.

EXPLANATION OF PLATE XLI.—See under preceding species.

39. **Abronia robusta** Standley, sp. nov. PLATE XLII.

Perennial; stems erect, 60 cm. high or less, very thick and stout, as much as 13 mm. in diameter, covered with an exceedingly dense short-hirsute pubescence; plant very leafy; leaf blades ovate, 4 to 8 cm. long, 2 to 5 cm. broad, obtuse or acute, cordate or truncate or broadly rounded at the base, densely puberulent on both surfaces or sometimes almost glabrous above; petioles thick, as long as or longer than the lower blades, those of the upper leaves shorter than the blades; peduncles 8 to 11 cm. long, stout, hirsute; bracts 6, puberulent, scarious, lanceolate, acuminate, 7 mm. long and 2 or 3 mm. wide; flowers numerous in rather dense heads, 2 cm. long, their tubes almost glabrous; fruits biturbinate, the outer ones of the head strongly so, the inner less markedly so, narrow, 5 to 7 mm. long and 3 mm. wide, with a stout beak above; the outer fruits merely ridged, the inner with narrow, thick wings or ridges, these not more than 1 mm. wide.

Nearest *A. fragrans*, but more robust, its bracts narrower, its stem densely hirsute. The type material in the herbarium of the Missouri Botanical Garden consists of 4 sheets collected on sand hills near Monahans, Ward County, Texas, May 10, 1901, by H. Eggert. This is the most densely pubescent Abronia that I have seen.

EXPLANATION OF PLATE XLII.—Fig. 1, *a*, plant of *Abronia robusta; b*, fruit of same. *a*, Scale ½; *b*, scale 2.

40. **Abronia fendleri** Standley, sp. nov. PLATE XLIII.

Apparently perennial; stems stout, erect, 30 or 40 cm. high, densely hirsute throughout; leaf blades rather broadly lanceolate, rather obtuse or acute at the apex, unequally and rather broadly cuneate at the base or subcordate in young plants, 25 to 50 mm. long and 12 to 20 mm. wide, sparingly puberulent on both surfaces, especially on the veins; petioles of the lower leaves as long as the blades, those of the stem leaves shorter, hirsute; peduncles 25 to 60 mm. long, hirsute, stout; bracts elliptical, scarious, 12 to 15 mm. long and 5 to 8 mm. wide, acute or sometimes cuspidate; flowers many, 2 cm. long, with a limb about 3 mm. wide, tubes densely puberulent; fruit narrowly turbinate, 9 mm. long and 5 mm. wide, with a very small body and 4 or 5 narrow wings which are 2.5 mm. wide, thin, rounded above, and projecting considerably above the body; the outline of the fruit narrowly obcordate, the beak short and small, hispidulous on beak and top of wings; seed 2 mm. long, dark brown, linear in outline.

The fruit of this plant is quite unlike that of *A. fragrans*, to which the species is most closely related; the pubescence, too, is more dense. Type in the herbarium of the Missouri Botanical Garden, collected at Santa Fe, New Mexico, May 19, 1847, *Fendler* 739, growing in "moist places near fields, etc." A sheet of the same collection in the National Herbarium was labeled "*A.*

ABRONIA ROBUSTA STANDLEY.

ABRONIA FENDLERI STANDLEY.

fragrans, Typ." by Doctor Heimerl, but the specimen is without fruit, which would have distinguished it at once.

Other specimens examined:

NEW MEXICO: Coolidge, 1889, *Hunson & Hopkins;* Chama River, 1904, *Wooton* 2827; Santa Fe, 1899, *Cockerell.*

The following specimens from farther south should probably be referred here. They do not altogether agree with A. *fendleri* and may possibly form a distinct species; they are certainly not A. *fragrans.* The plants are more erect, less branched, and less spreading than the Santa Fe plant, besides differing in several other particulars.

NEW MEXICO: Mesilla Valley, 1893, *Wooton;* Tortugas Mountain near Las Cruces, 1900, *Cockerell;* Mexican Boundary Survey 1121; Jornado del Muerto, 1846, *Wislizenus* 81.

CHIHUAHUA: Near Paso del Norte, 1886, *Pringle* 794.

TEXAS (?): *Wright* 1711.

EXPLANATION OF PLATE XLIII.—*a*, Plant of *Abronia fendleri;* *b*, fruit of same. *a*, Scale ½; *b*, scale 2.

41. **Abronia fragrans** Nutt.; Hook. Kew Journ. Bot. **5**: 261. 1853. FIGURE 63.

Perennial, erect; stems more or less puberulent throughout, rather stout; leaf blades ovate or elliptical, rounded or narrowed at the base, mostly obtuse or acutish at the apex, minutely puberulent and roughened on both surfaces or glabrous above; bracts ovate or broadly elliptical, acute or attenuate, 10 to 15 mm. long and about 8 mm. wide; flowers 2 cm. long or more, greenish-white; fruit 6 mm. long and 4 mm. wide or often larger, usually distinctly biturbinate, the outer ones strongly so and often irregular; fruit not winged, but with low, thickened ridges which are strongly veined.

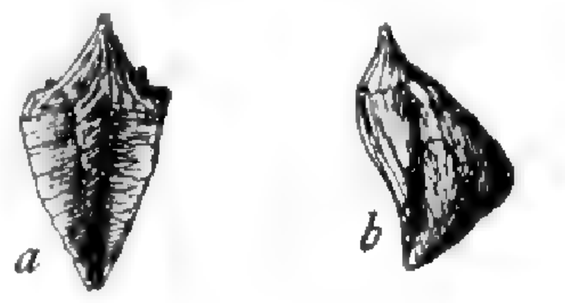


FIG. 63.—a, b, Two views of the fruit of *Abronia fragrans.* Scale 2.

The plants included here are, as a whole, remarkably uniform, although a few variant forms will be found. A form of the species which extends into western Kansas differs considerably in general appearance, but I have been unable to separate it. A plant from Oklahoma is reported to have red flowers, but otherwise it does not seem remarkable.

Specimens examined in part:

NEBRASKA: War Bonnet Canyon, 1890, *T. A. Williams;* Alliance, 1889, *H. L. Webber;* near Thedford, 1893, *Rydberg* 1263.

KANSAS: Arkalon, 1888, *Kellerman;* Syracuse, 1893, *C. H. Thompson* 124; Hamilton County, 1895, *Hitchcock* 422.

COLORADO: Fossil Creek, 1897, *Crandall* 4076; Fort Collins, 1896, *C. F. Baker;* Buena Vista, 1892, *C. S. Sheldon* 562; Crow Creek, 1896, *Knowlton* 98; Half-moon Creek, 1873, *John Wolf* 813; north of Denver, 1881, *L. F. Ward;* Arkansas Canyon, 1881, *G. Engelmann;* Colorado Springs, 1903, *E. R. Warren* 1961; near Boulder, 1902, *Tweedy* 4976; Manitou, 1890, *G. C. Broadhead.*

WYOMING: Sybille Creek, 1894, *A. Nelson* 335; Egbert, 1899, *Pammel* 17; Pine Bluffs, 1897, *A. Nelson* 3504; Platte River, 1894, *A. Nelson* 3123.

NEW MEXICO: Thirty-five miles west of Roswell, 1900, *Earle* 372; Delaware Creek, 1893, *Nealley,* a narrow-bracted form; Cimarron on the Santa Fe Road, 1846, *Wislizenus* 462; Fort Wingate, *Rusby* 6992; Lamy, 1895, *Mulford* 65; Farmington, 1904, *Wooton* 2825; La Vega de San José, 1892, *Wooton;* Willard, 1904, *Wooton* 2826; near Gallup, 1903, *Wooton;* Upper Rio Pecos, 1905, *Mrs. Florence Bartlett.*

42. **Abronia nudata** Rydb. Bull. Torr. Club **29**: 683. 1902. FIGURE 64.

FIG. 64.—Fruit of *Abronia nudata*. Scale 2.

This differs from *A. fragrans* in its smaller bracts, more glabrous stem, and its decumbent habit.

Specimens examined:

MONTANA: Colgate near Glendive, 1892, *Sandberg, MacDougal & Heller* 1016, type collection.

43. **Abronia glaucescens** (A. Nelson) Standley.

Abronia fragrans glaucescens A. Nelson, Bot. Gaz. **34**: 364. 1902.

The glabrous stem and flowers, the thick leaves, and the glaucous leaves and stems separate this from *A. fragrans*, which it resembles in habit. From *A. nudata* it can be separated by its larger bracts and leaves, more erect habit, and more glabrous fruit and stem. No type was designated in the original description, and I would suggest as a type the collection from Casper, Natrona County, Wyoming, "in sandy, rocky river bottoms," July 6, 1901, *Goodding* 210.

Other specimens examined:

WYOMING: Inyan Kara Divide, 1892, *Buffum* 786; Casper, 1891, *Buffum* 785; Cheyenne, 1895, *A. Nelson* 1996; Powder River, 1894, *Vernon Bailey* 30.

COLORADO: Manitou, 1886, *Fritchey*.

44. **Abronia ammophila** Greene, Pittonia **4**: 226. 1900. FIGURE 65.

Abronia arenaria Rydb. Mem. N. Y. Bot. Gard. **1**: 137. 1900, not Menz.

Abronia nelsoni Heimerl, Ann. Cons. et Jard. Genev. **5**: 191. 1901.

Abronia cheradophila A. Nelson, Bot. Gaz. **34**: 364. 1902.

FIG. 65.—Fruit of *Abronia ammophila*. Scale 2.

This much-named species is a very distinct one because of its prostrate habit, narrow leaves, lanceolate bracts only about 4 mm. long, and peculiar fruit.

Specimens examined:

WYOMING: Yellowstone Lake, 1899, *A. & E. Nelson* 6633; Yellowstone Lake, 1871, *Robert Adams;* same locality, 1885, *Tweedy* 1442.

FIG. 66.—Fruit of *Abronia lanceolata*. Scale 2.

45. **Abronia lanceolata** Rydb. Bull. Torr. Club **29**: 685. 1902.

FIGURE 66.

Specimens examined:

IDAHO: Idaho Falls, 1901, *Merrill & Wilcox* 870, type; Idaho Falls, 1893, *Palmer* 384; Blackfoot, 1893, *Palmer* 462; St. Anthony, 1900, *Merrill* 441.

46. **Abronia mellifera** Dougl. in Hook. Bot. Mag. **56**: *pl. 2879*. 1829. FIGURE 67.

Abronia suksdorfii Coult. & Fish. Bot. Gaz. **17**: 348. 1892.

This can be distinguished from any other member of the *fragrans* group by the broad, thin wings of the fruit and the narrow bracts; its stem is finely puberulent throughout, while the stems of *A. lanceolata* are almost or quite glabrous. *A. suksdorfii* I can not separate from any other form of the species; the types of this and *A. mellifera* are from nearly the same locality.

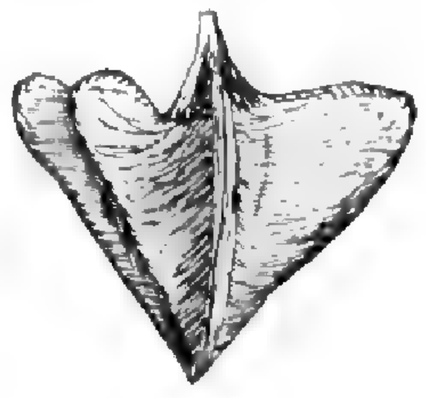


FIG. 67.—Fruit of *Abronia mellifera*. Scale 2.

Specimens examined:

WASHINGTON: Near Columbus, 1886, *Suksdorf* 895; near Rock Island, 1893, *Sandberg & Leiberg* 464; Cow Creek, 1902, *Griffiths & Cotton* 543; Pasco, 1898, *Elmer* 1055; Walla Walla, Wilkes

Exploring Exped.; Walla Walla, 1903, *J. S. Cotton* 1058; Kiona, 1902, *Cotton* 724; Craigs Ferry, Kittitas County, 1903, *Cotton*; Washington, 1883, *Canby* 1037.

OREGON: Near The Dalles, 1881, *Howell*.

ABRONIA TURBINATA MARGINATA Eastwood, Proc. Cal. Acad. II. **6**: 313. I have not been able to determine this from the description, nor have I succeeded in seeing the type collection, which consisted of only a single specimen.

2. TRIPTEROCALYX Hook.

Tripterocalyx Hook. Kew Journ. Bot. **5**: 261. 1853.

Abronia § *Tripterocalyx* Torr. Frem. First Rep. 92. 1843.

Cycloptera Nutt.; A. Gray, Am. Journ. Sci. II. **15**: 319. 1853, not Endl. Enchir 113. 1841.

Apaloptera Nutt.; A. Gray, loc. cit.

Abronia of various authors, in part.

Stout, much branched annuals, usually more or less pubescent, the pubescence consisting of flattened, several-celled hairs; stems erect, ascending, or rarely procumbent; leaves opposite, entire, usually unequal; involucral bracts 4 to 6, separate, folded over the flowers in the bud; perianth with a long slender tube and a broad, expanded, 5-lobed limb: flowers in the involucre numerous; stamens 5, with very short filaments, attached at irregular intervals to the upper part of the tube of the perianth; fruit almost orbicular in outline, with a coriaceous or spongious body, this often ribbed and completely surrounded by the 2 to 4 broad wings, which are thin and strongly reticulate-veined; stipe prolonged below through the membranous wings; seeds narrowly elliptical, cylindrical.

Type species, *Abronia micrantha* Torr. This is also the type of the genera Cycloptera and Apaloptera.

This genus is well worthy of separation from the true Abronias because of its peculiar fruit, whose wings completely surround the body. The central cavity, moreover, does not extend into the wings as it does in all or most species of Abronia. The plants are so different in general appearance, habit, and especially in the appearance of the heads of the fruit, that no one can have any difficulty in distinguishing the two genera at a glance. The two are sharply defined, there being no intergradient forms.

KEY TO THE SPECIES.

Body of the fruit between the wings transversely wrinkled or ribbed, the ribs extending into the wings	1. *T. crux-maltae.*
Body of the fruit not transversely wrinkled, but frequently with vertical ribs between the wings.	
Flowers 2 cm. long or less.	
Body of the fruit spongious, without vertical ribs; stems pubescent; peduncles shorter than the leaves	2. *T. micranthus.*
Body of the fruit scarcely spongious, frequently with longitudinal ribs between the wings; stems glabrous; peduncles as long as the leaves or longer	3. *T. pedunculatus.*
Flowers more than 2 cm. long, usually almost 3 cm.	
Fruit 20 to 28 mm. long; flowers bright pink; plant stout; stems sparingly pubescent; bracts narrowly ovate	4. *T. cyclopterus.*

Fruit less than 20 mm. long; plant lower and less robust; flowers whitish or very pale pink; stems rather densely pubescent; bracts narrowly lanceolate ---------- 5. *T. wootonii.*

1. **Tripterocalyx crux-maltae** (Kellogg) Standley.

Abronia crux-maltae Kellogg, Proc. Cal. Acad. **2**: 71. 1863.

This species has probably more handsome flowers than any other species of Tripterocalyx or Abronia.

Specimens examined:

NEVADA: Wadsworth, 1904, *Kennedy* 871; Truckee Pass, Virginia Mountains, 1903, *Kennedy* 734; 1 mile west of Reno, 1901, *Heizer* 309; Reno, 1888, *Sonne* 488; Carson City, 1897, *Jones;* Gillis, 1883, *Shockley* 349; Empire City, 1882, *Jones* 4038; Pah Ute Mountains, 1869, *Watson* 967.

CALIFORNIA: Sierra Nevada Mountains, 1875, *Lemmon.*

2. **Tripterocalyx micranthus** (Torr.) Hook. Kew Journ. Bot. **5**: 261. 1853.

Abronia micrantha Torr. in Frem. First Rep. 92. 1843.

This can be easily distinguished from *T. cyclopterus*, with which it has often been confused, by its smaller, greenish-white flowers, smaller bracts, and spongious fruit, which has no vertical ribs.

Specimens examined, in part:

MONTANA: Glendive, 1892, *Sandberg, Heller & MacDougal;* Yankee Jim Canyon, 1899, *Blankinship* 424; Beaver Head County, 1888, *Tweedy* 121.

WYOMING: Marquette, 1893, *Rose* 123; Fort Steele, 1901, *Tweedy* 4614; Washington's Ranch, Sweetwater County, 1901, *Merrill & Wilcox* 795; Evanston, 1897, *A. Nelson* 4123; Willow Creek, 1894, *A. Nelson* 3742; Laramie, 1897, *E. Nelson* 3414; Dunn's Ranch, Albany County, 1900, *A. Nelson* 7624; Alcova, 1901, *Goodding* 155.

UTAH: Price, 1898, *Susan G. Stokes.*

COLORADO: Near Grand Junction, 1900, *S. G. Stokes;* valley of the Arkansas, *Wheeler Survey* 815; Denver, 1885, *Letterman;* Platte Valley below Greeley, 1881, *Ward;* Telluride, 1894, *Tweedy* 129; Grand Junction, 1894, *Jones* 3476; Fort Collins, 1892, *Crandall;* headwaters of Sangre de Cristo Creek, 1900, *Rydberg & Vreeland* 6311; Canyon City, 1871, *Brandegee* 100.

NEVADA: Muddy Valley, Lincoln County, 1906, *Kennedy & Goodding* 1700.

ARIZONA: Beaver Dam Creek, 1902, *Goodding.*

NEW MEXICO: Albuquerque, 1853, *Bigelow;* opposite San Juan, Rio Arriba County, 1897, *Heller* 3766.

KANSAS: Syracuse, 1893, *C. H. Thompson.*

NEBRASKA: Cheyenne County, 1891, *Rydberg* 339.

3. **Tripterocalyx pedunculatus** (Jones) Standley.

Abronia micrantha pedunculata Jones, Proc. Cal. Acad. II. **5**: 716. 1895.

Abronia pedunculata Rydb. Bull. Torr. Club **29**: 686. 1902.

Specimens examined:

UTAH: St. George, 1894, *Jones* 5101, type; St. George, 1894, *Jones* 5139; Green River, 1895, *Jones;* Green River, 1894, *Jones* 5482m; La Verken, 1894, *Jones* 5183; Thompsons Springs, 1892, *Eastwood.*

ARIZONA: Twenty miles above Pierces Ferry, 1894, *Jones* 5077a.

4. **Tripterocalyx cyclopterus** (A. Gray) Standley.

Abronia cycloptera A. Gray, Am. Journ. Sci. II. **15**: 319. 1853, excluding synonyms.

Abronia carnea Greene, Pittonia **3**: 343. 1898.

This name might very properly be reduced to synonymy if it were not for the fact that certain excuses can be offered for it. Doctor Gray evidently intended it merely as a new name for *Abronia micrantha* because he considered the latter name inapplicable to specimens he had examined which were really not *A. micrantha* at all, but a southwestern plant which resembles it somewhat. From what he says at the time he proposed the name it can be definitely stated that he had in mind the specimens collected by Wright in western Texas and not the northern plant to which the name *micrantha* was originally applied. The name will be considered a *nomen nudum* by some, or a mere synonym of *T. micranthus*, but the present author believes that long-established usage makes it allowable and preferable to retain it.

Abronia carnea is certainly a synonym of *T. cyclopterus;* the types of the two came from localities separated by not more than 40 miles. The plant is not a perennial, as Doctor Greene surmises in his description, but an annual which blooms from early in the spring until late in the summer.

Specimens examined:

TEXAS: *Wright* 1712, type collection; San Antonio, 1891, *L. H. Dewey;* Belen, El Paso County, 1893, *Mearns* 1514.

CHIHUAHUA: Near Paso del Norte, 1885, *Pringle* 75.

NEW MEXICO: Rincon, 1884, *Jones;* Deming, 1895, *Mulford* 1015; Mesilla Valley, 1893, *Wooton;* same locality, 1897, *Wooton* 56; Chavez, 1892, *Wooton;* near Albuquerque, 1853, *Bigelow;* Pecos River, 1905, *Mrs. Florence Bartlett;* Mexican Boundary Survey 1117; Chavez, 1846, *Wislizenus* 23.

5. **Tripterocalyx wootonii** Standley, sp. nov.

Annual: stems ascending, 25 cm. high, with scattered rough pubescence throughout, finer than that of *T. cyclopterus;* leaf blades rather broadly lanceolate, 30 or 40 mm. long and 10 to 15 mm. wide, the margins sometimes slightly undulate, ciliolate; blades with rather abundant chaffy pubescence beneath and frequently above, acute or rarely rather obtuse, narrowed at the base into a petiole as long as the blade or shorter; peduncle 6 cm. long, with rather abundant viscid pubescence; bracts 11 to 15 mm. long and 2 mm. wide, narrowly lanceolate, long-acuminate; flowers 25 to 30 mm. long, whitish or very pale pink, tube densely glandular-pubescent, limb 9 mm. broad; fruit 15 to 20 mm. long and almost as broad, hispidulous especially on the ribs and along the margins of the wings; wings not as much narrowed below as those of *T. cyclopterus*, rounded above, finely reticulate-veined, the body with usually 3 strong ribs between each pair of wings; seed 5 mm. long.

Most of the material from northwestern New Mexico and northeastern Arizona which has passed as *T. cyclopterus* is to be placed here. This species is distinguished from that by its considerably smaller, hispidulous fruit (the fruit of some of the northern plants is much smaller than that of the type), narrower bracts, more pubescent stems and peduncles, and pale flowers, and by its lower, less erect habit; the leaves when fresh have a peculiar glaucous appearance different from leaves of *T. cyclopterus*. The differences in general appearance between the two species are less apparent in dried than in living material. Type in the herbarium of the New Mexico Agricultural College, con-

sisting of two plants, both collected by E. O. Wooton, one near Ojo Caliente, Zuni Reservation, New Mexico, July 20, 1906, and the other on the Zuni Reservation in 1904, no. 2820.

Other specimens examined:

NEW MEXICO: Zuni valley, 1902, *Conard* 14.

ARIZONA: Near Hardy, 1903, *Wooton;* Winslow, 1892, *Wooton;* St. Joe, 1892, *Wooton;* 11 miles east of Winslow, 1892, *Wooton;* Adamana to Long H Ranch, 1903, *Griffiths* 5162; northeastern Arizona, 1896, *Hough* 16; 18 miles below Black Falls, 1901, *Ward;* 3 miles northeast of Winslow, 1901, *Ward;* Little Colorado River, 1896, *Fernow;* Winslow, 1903, *Griffiths* 5025; Holbrook, 1896, *Myrtle Zuck.*

3. NYCTAGINIA Choisy.

Nycataginia Choisy in DC. Prod. 13²: 429. 1849.

Annual, erect, or ascending viscid herbs with dichotomous-branching stems; leaves opposite, the blades somewhat toothed or entire, petioled; flowers reddish, numerous, surrounded by a polyphyllous, many-bracted involucre; perianth funnelform with a narrow tube and a broad, 5-lobed limb; stamens unequal, exserted, their filaments slender, dilated, united below; style slender, the stigma capitate; fruit leathery, turbinate, 10-ribbed, the seed filling and adhering to the pericarp.

KEY TO THE SPECIES.

Leaves triangular-ovate, their margins mostly entire; flowers orange-red ..... 1. *N. capitata.*

Leaves triangular-hastate, thicker, their margins irregular or toothed; flowers crimson ..... 2. *N. cockerellae.*

1. **Nyctaginia capitata** Choisy in DC. Prod. 13²: 429. 1849.

Bocrhaavia capitata Heimerl, Jahresb. Staats-Oberrealsch. Fünfhaus Wien 23: repr. 28. 1897.

Type locality, In Texas apud S. Antonio de Biscar.

Specimens examined:

TEXAS: *Wright* 1709, 600; San Antonio, 1881, *Reverchon* 786; Mexican Boundary Survey 1122; Dallas, 1882, *Reverchon* 2336; Roma, 1889, *Nealley* 227; Knickerbocker Ranch, Tom Green County, 1880, *Tweedy;* Del Rio, 1891, *L. H. Dewey;* Barstow, 1902, *Tracy* 8343; Bexar County, *Jermy* 64; Fort Davis, 1881, *Havard;* near Bracken, 1903, *Groth* 73; San Angelo, 1903, *Reverchon;* San Antonio, *E. H. Wilkinson* 122; Laredo, 1879, *Palmer* 1114; near Laredo, 1899, *Mackenzie* 5; prairies near Big Springs, 1900, *Eggert;* near Stanton, 1900, *Eggert.*

MEXICO: Gallejo Springs between El Paso and Chihuahua, 1846, *Wislizenus* 111; Saltillo, 1848, *Gregg.*

2. **Nyctaginia cockerellae** A. Nelson, Proc. Biol. Soc. Wash. 16: 29. 1903.

This plant differs from *A. capitata* in its thicker, subhastate leaves, rather smaller flowers, and less exserted stamens. The difference in number of stamens mentioned by Professor Nelson does not hold, neither does the difference in their insertion. I have not been able to see any essential difference in the shape of the lobes of the perianth in the two species. The flowers in this species are of a much deeper red color. The plant seems to be a very distinct one, readily distinguishable almost at a glance by its appearance, a species confined in its range to the upper valley of the Rio Pecos.

Prof. T. D. A. Cockerell,[a] guided evidently by the original description of this species, was led to found upon it a separate section of the genus under the name Roswellia. The plant certainly does not differ generically from *A. capitata*, as he was inclined to believe, and I think it can not be worthy even of a separate section.

Specimens examined:

NEW MEXICO: Roswell, 1902, *Wilmatte P. Cockerell*, type; Dexter, 1905, *Wooton;* 20 miles south of Roswell, 1900, *Earle* 324; Delaware Creek, 1893, *Nealley* 4.

TEXAS: Screw Bean, 1893, *Nealley* 5.

4. WEDELIA Loefl.

Wedelia Loefl. Iter Hisp. 180. 1758.

Allionia L. Syst. ed. 10. 890. 1759, in part.

Annual or perennial prostrate herbs; leaves opposite, unequal, entire, petioled; flowers reddish or rarely white, 3 in each involucre; involucres composed of 3 sepal-like bracts which are united at the base, solitary on peduncles in the axils of the leaves; perianth corolla-like, with a short oblique tube and an unequally 4-lobed limb; stamens exserted or included, their filaments slender; ovary 1-celled, the style filiform, stigma capitate; fruit leathery, winged on each side, smooth upon the inner side or crested in one species, but with two parallel rows of glands on the outer surface.

The plant upon which this genus was founded later received the name of *Allionia incarnata* L.

KEY TO THE SPECIES.

Fruit crested on the inner surface	1. *W. cristata.*
Fruit not crested on the inner surface.	
Wings with numerous sharp teeth, these not incurved	2. *W. glabra.*
Wings with fewer teeth, which are much less acute and usually strongly incurved.	
Stems villous; teeth obtuse, 2 or 3; perianths large about 12 mm. wide; stems abundantly leafy above	3b. *W. incarnata villosa.*
Stems mostly pubescent, but not strongly villous.	
Upper internodes long and the upper leaves considerably reduced	3c. *W. incarnata nudata.*
Upper internodes not especially long and the upper leaves not noticeably reduced; teeth obtuse to somewhat acute	3. *W. incarnata.*

1. **Wedelia cristata** Standley, sp. nov.

Stems rather slender, viscid-puberulent, straw-colored; leaf blades elliptical to oblong, the two sides asymmetrical, acute, oblique at the base or rounded, dull green above and paler beneath, sparingly short-puberulent, especially above, 21 mm. or less in length and 14 mm. or less in width; petioles one-third to one-half as long as the blades; peduncles 18 mm. long or less; bracts almost orbicular, slightly saccate, rounded at the apex, 3 mm. long or less; flowers 8 or 9 mm. long, the lobes of the perianth with deep and narrow sinuses between them, the lobes themselves rather deeply 2-cleft; stamens included; fruit 4 to 5 mm.

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[a] Proc. Biol. Soc. Wash. **16**: 52.

long, each wing having 3 or more incurved teeth straw-color; the inner surface of each fruit in most species furnished in place of the ventral nerve with a crest 1 mm. high or more, with the margin entire or slightly toothed, the crest wider below, i. e., at the end at which the fruit is attached.

The remarkable fruit of this plant separates it at once from any other species of the genus. Type U. S. National Herbarium no. 349027, collected at Holbrook, Arizona, July 15, 1896, by Myrtle Zuck.

2. **Wedelia glabra** (Choisy) Standley.

Allionia incarnata glabra Choisy in DC. Prod. 13²: 435. 1849.

Annual; stems reddish, prostrate, much branched from the base, slender, sparingly white-puberulent with rarely a few longer, soft, white hairs; leaf blades oblong or elliptical, 23 mm. or less in length and 11 mm. or less in width, obtuse at the apex, rounded or sometimes oblique at the base, almost glabrous, yellowish-green above, glaucous below and usually conspicuously purplish; petioles shorter than the blades, mostly about one-third as long, slender; peduncles 11 mm. or less in length, usually one at each node; bracts somewhat saccate, broadly obtuse, ciliolate, puberulent; flowers 4 mm. long or less, rose-red; stamens included; fruit light straw-color or greenish, 4 mm. long and about as wide, with 3 prominent vertical ribs on the ventral surface and about 7 sharp, narrow, long teeth on each side, these usually not incurved, but extended in the same plane as the body of the fruit; on the dorsal surface of the fruit are two rows of short-pediceled glands, about 6 glands in each row; leaves more or less wavy-margined and the whole surface of the blade often more or less wavy.

The description is based upon plants collected in the Mesilla Valley, New Mexico, which seem well to match portions of the type collection preserved in the Bernhardi Herbarium. The name *glabra* is not an especially appropriate one.

The species is distinguished by its peculiar fruit whose wings are not incurved as they are in other species; whose teeth, too, are sharper and more numerous. It is also separated by its small, obtuse, purplish and often glaucous, undulate leaves, and by its slender stems. It is, in New Mexico and in other places from which I have examined specimens with roots, an annual plant, while most of the other species are perennials.

Specimens examined:

MEXICO: Environs de Mexico (City), *Berlandier*, type collection; San Luis Potosi, 1879, *Schaffner* 562; near Saltillo, 1848, *Gregg* 466, 484.

ARIZONA: Long H Ranch to St. John's, 1903, *Griffiths* 5193; Beaver Creek, 1883, *Rusby* 355.

TEXAS: Near Colorado, 1900, *Eggert.*

NEW MEXICO: Mesilla Valley, 1900, *Wooton;* Mesilla Valley, 1907, *Wooton & Standley* 3893; Albuquerque, 1894, *Herrick;* Santa Fe, 1847, *Fendler* 634; 20 miles south of Roswell, 1900, *Earle* 321; Gray, 1898, *Skehan* 102; Santa Fe, 1898, *Cockerell;* Santa Fe, 1881, *Engelmann;* south of Las Cruces, 1906, *Standley;* Delaware Creek, 1893, *Nealley* (in part).

3. **Wedelia incarnata** (L.) Kuntze, Rev. Gen. Pl. 533. 1891.

Allionia incarnata L. Syst. ed. 10. 890. 1759.

Although I have separated several varieties from this species, the specimens included here would probably bear still further division. The greatest trouble in making separations is found in the occurrence of numerous intergrading forms. Forms are found which connect all of these varieties with the species.

It is almost impossible to find two specimens which match each other in every important detail.

Specimens examined:

TEXAS: El Paso, 1884, *Jones* 3776; Mexican Boundary Survey 1116; Upper Llano, 1885, *Reverchon* 1585; Barstow, 1902, *Tracy* 8346; along Devils River, 1900, *Eggert;* near Big Springs, 1900, *Eggert;* 1849, *Wright* 597.

NEW MEXICO: Organ Mountains, 1897, *Wooton* 145; Burro Mountains, 1903, *Metcalfe* 724; near Cliff, 1903, *Metcalfe* 149; below Highrolls, 1905, Wooton, a form with white flowers that seems to be not uncommon; near Lake Arthur, 1905, *Wooton;* Delaware Creek, 1893, *Nealley* 8.

MEXICO: Near Chihuahua, 1886, *Pringle* 1062; Saltillo, 1898, *Palmer* 81.

ARIZONA: Santa Rita Forest Reserve, 1903, *Griffiths* 5903; Tucson, 1894, *Toumey.*

COLORADO: Canyon City, 1873, *Greene* 6.

BOLIVIA: Bolivian Plateau, 1891, *Bang* 928.

The species is said to extend into South America as far as Argentina and Chile.

3a. **Wedelia incarnata anodonta** Standley, subsp. nov.

This subspecies is distinguished by the form of the fruit whose wings have smooth margins, not toothed as in all other species and varieties. Otherwise the plant is like the species. The plants with this kind of fruit are somewhat variable, and it is possible that two forms have been included in the specimens listed under this one subspecies.

Type in the herbarium of the Field Museum of Natural History, no. 155550, collected on "plains of western New Mexico," July, 1880, Rusby 355.

Other specimens examined:

NEW MEXICO: Valverde, north of the Jornado del Muerto, 1846, *Wislizenus* 54; Albuquerque, 1846, *Wislizenus* 13.

ARIZONA: Yucca, 1884, *Jones;* Beaver Creek, 1883, *Rusby* 286.

The Arizona plants are rather larger and more robust than those from New Mexico.

3b. **Wedelia incarnata villosa** Standley, subsp. nov.

Perennial from a thick, woody root; stems branched mostly from the base, stout, villous throughout, straw-colored; leaf blades elliptical, acutish or obtuse, 34 mm. long and 18 mm. wide or less, rounded or oblique at the base, short-villous on both surfaces, especially on the veins; petioles mostly about one-half as long as the blades; peduncles 2 cm. long or less, slender, villous, few; bracts about 7 mm. long, ovate, not saccate, acutish; stamens about as long as the perianth or slightly exserted; fruit straw-colored, about 4.5 mm. long, with 3 rather conspicuous ventral nerves, and with 2 or 3 irregular, low, and blunt teeth on each wing.

The variety is distinguished by its villous stems and leaves and its large flowers, whose stamens are often exserted. Type in the herbarium of Field Museum of Natural History, collected on "mesas and foothills" in Arizona, May 22, 1881, Pringle; cotype in the herbarium of the Missouri Botanical Garden.

Other specimens examined:

ARIZONA: Fenced area, Santa Rita Forest Reserve, 1903, *Griffiths* 4405, 4784; near Fort Huachuca, 1894, *Wilcox* 265, 147; Fort Grant, *B. H. Dutcher* 16, 17, 18; Santa Catalina Mountains, 1880, *Lemmon;* Tubac

to Sopori, 1903, *Griffiths* 6135; near Clifton, 1880, *Greene;* Fort Whipple, 1865, *Coues & Palmer* 467, 281; Castle Creek, 1892, *Toumey* 471a; Babuquivari Valley, 1903, *Griffiths* 3967.

CHIHUAHUA: Mexican Boundary Line near White Water, 1892, *Mearns* 368, 361.

COLORADO: Soda Spring Ledge, Canyon City, 1874, *Brandegee* 896.

3c. **Wedelia incarnata nudata** Standley, subsp. nov.

Perennial from a thick, woody root: stems slender, with scattered, short, soft, more or less viscid hairs; internodes long, especially the upper ones; leaf blades oval or elliptical, 26 mm. long and 14 mm. wide or less, obtuse, rather densely puberulent on both surfaces, rounded or oblique at the base; the upper blades much smaller, more acute, and with shorter petioles; petioles one-half as long as the blades or shorter; peduncles 10 mm. or less in length; bracts 4 mm. long or less, elliptical, acutish; flowers 6 mm. or less in length, the stamens included; fruit straw-colored, 3 mm. long, with a prominent ventral nerve, the lateral ones faint or wanting, the wings with 2 or 3 low, rather obtuse, incurved teeth.

Nearest subspecies *villosa*, but its stems less pubescent, the internodes longer, and the stem less leafy above, the flowers and leaves smaller. Type in the herbarium of the University of California, collected in Coyote Canyon, western border of the Colorado Desert, in the Lower Sonoran Zone, at an altitude of about 1,540 meters, 1902, *Hall* 2799.

Other specimens examined:

CALIFORNIA: Palm Canyon, 1901, *Hall* 1872.

NEVADA: Moapa, 1905, *Kennedy* 1110; Muddy Valley, 1906, *Kennedy & Goodding.*

The following should probably be placed here, although they have rather larger leaves and fruit and their flowers are slightly larger. In general appearance, habits, etc., they resemble most this variety.

UTAH: St. George, 1902, *Goodding* 809; St. George, 1875, *Palmer;* Toquerville, 1894, *Jones* 6087; La Verken, 1894, *Jones* 5191.

ARIZONA: Northeast of Holbrook, 1901, *Ward.*

5. ALLIONIA Loefl.

Allionia Loefl. Iter Hisp. 181. 1758.
Vitmania Turra ex Cav. Ic. **3**: 53. 1794, not *Vitmannia* Vahl. 1794.
Oxybaphus L'Her. Willd. Sp. Pl. **1**: 185. 1797.
Calyxhymenia Ortega, Nov. Rar. Pl. Hort. Matr. 5. 1797.
Calymenia Pers. Syn. **1**: 36. 1805.
Mirabilis Heimerl in Engl. & Prantl, Pflanzenfam. 3[1b]: 24. 1894, in part, not L.

Perennial herbs, glabrous or pubescent, with the branches of the stem and inflorescence opposite or alternate; leaves opposite, rather fleshy, entire, petioled or sessile; flowers 1 to 5 in each involucre, white, pink, purplish red, or crimson, surrounded by a gamophyllous, 5-lobed involucre which is enlarged and membranous in fruit; perianth campanulate or infundibuliform, often oblique, with an erect or spreading limb; stamens 2 to 5, unequal, filaments very slender, united at the base; fruit club-shaped, 5-angled or 5-ribbed, pubescent or glabrous.

The genus was based upon a plant which was later named *Allionia violacea* L. Vitmania and Oxybaphus were founded on *A. viscosa;* Calyxhymenia upon *A. glabrifolia;* and Calymenia upon six species, all true Allionias, without the designation of any one of them as the type.

The genus Allionia contains about 20 species besides those cited here. It is best represented in the western and southwestern parts of the United States and in Mexico; it extends into South America as far as Chile and Peru. It is a remarkable fact that one species, *A. himalaica*, extends into the Himalaya Mountains of Asia, the only species to be found outside the western hemisphere. A number of species occur in Mexico which are not included in this paper because of the inability of the author to secure reliable material of them. A considerable number of sheets of Mexican origin were seen which were referred by their collectors to *A. violacea*, *A. glabrifolia*, and similar species, but the author was unable to determine them satisfactorily, the only material in whose identity any confidence could be placed being that in the Bernhardi Herbarium.

The various species, although they do not usually cover such wide ranges as the species of Boerhaavia, extend sometimes over rather large areas. Some species, such as *A. hirsuta* and *A. nyctaginea*, are found almost throughout the central-western part of the United States, while others, judging from the material now in the various herbaria, are confined to very small areas, areas as small as those occupied by species of Abronia. In this matter of the extent of distribution of individual species this genus stands midway between Abronia and Boerhaavia.

Allionia can be at once divided into two natural sections, one with flowers whose perianths are crimson in color and have a conspicuous tube, and the other with flowers whose perianths are purplish, pink, white, or greenish, but never scarlet, and are campanulate in form. It is possible that at some time the crimson-flowered species will be found worth separating as a new genus. They are so like the other species in habit and general appearance, however, that the writer has thought best to leave them in the genus Allionia.

There is room for some interesting field work in this genus, especially in order to determine the relation of the forms with axillary inflorescence to those with panicled or cymose inflorescence. The opinion has been expressed by various persons that some of the forms with axillary flowers may be merely depauperate or shade forms of species with more numerous flowers. *A. aggregata* bears a very striking resemblance to *A. hirsuta*, *A. decumbens* to *A. lanceolata*, and *A. bodini* to *A. linearis*. Several other similar cases could be mentioned. The possibility of *A. aggregata* and *A. hirsuta* being variations of the same plant is made more plausible by the fact that they occupy practically the same area of distribution; the same is true in the other two instances mentioned. If it should be proved that one of these pairs is related in the way suggested—that is, that the axillary-flowered plant is merely a form of another larger plant induced by peculiar environmental conditions—then such plants as *A. decumbens*, *A. aggregata*, and others should, of course, take the rank of subspecies of the species to which they are most closely related. There are a few of the forms with axillary involucres which do not seem to be closely related to other more complex forms, but perhaps this is because the plants to which they are related have not yet been collected.

KEY TO THE SPECIES.

Perianth scarlet, with a conspicuous tube; leaves linear.

Plants sparingly branched, tall and erect; involucres 3-fruited; flowers not cleistogamous ..... 1. *A. coccinea.*

Plants diffusely branched, lower; involucres mostly 1-fruited; flowers usually cleistogamous; plants more slender.

Leaves filiform---------- 2a. *A. gracillima filifolia.*

Leaves linear.

Stems glabrous except on and near the pedicels-- 2. *A. gracillima.*

Stems scabrate almost throughout---------- 2b. *A. gracillima scabridata.*

Perianth not scarlet; campanulate.

Leaves linear or narrowly linear-lanceolate.

Inflorescence paniculate or cymose.

Fruit glabrous.

Plant low and slender; leaves linear; inflorescence cymose, i. e., its branches alternate-- 3. *A. petrophila.*

Plant tall and stout; leaves wider and thicker; inflorescence paniculate, i. e., with opposite branches---------- 4. *A. glabra.*

Fruit not glabrous.

Plants tall, erect, stout; stems simple or sparingly branched; inflorescence paniculate; leaves sessile.

Stems glabrous below---------- 5. *A. linearis.*

Stems more or less hirsute below ---------- 5a. *A. linearis subhispida.*

Plants lower; stems more branched and diffuse, or the inflorescence cymose.

Leaves divaricate, distinctly petioled; branches of the inflorescence merely viscid-puberulent---------- 6. *A. divaricata.*

Leaves mostly erect, sessile; branches of the inflorescence densely viscid hairy.

Plant low; leaves thick and dull green-- 7. *A. diffusa.*

Plant larger and much more branched; leaves thin and bright green---------- 8. *A. glandulifera.*

Inflorescence axillary or of few-flowered clusters at the ends of the branches.

Lobes of the involucre elliptical, rather obtuse; plants very slender, the stems simple or sparingly branched---------- 11. *A. pinetorum.*

Lobes of the involucre lanceolate to elliptical, acute; plants much branched.

Involucre covered with long and soft hairs; leaves more or less subpilose; fruit with thick, smooth ribs, obtuse---------- 9. *A. vaseyi.*

Involucre puberulent; leaves glabrous; fruit with narrower and less conspicuous ribs, acute---------- 10. *A. bodini.*

Leaves neither linear nor narrowly linear-lanceolate.

Inflorescence axillary.

Stems hirsute---------- 12. *A. aggregata.*

Stems not hirsute.

Stems glabrous below.

Stems slender, sparingly branched; leaves glabrous---------- 13. *A. decumbens.*

Stems stouter, much branched; leaves conspicuously ciliate ..... 14. *A. ciliata.*
Stems puberulent throughout, low, much branched.
Leaves ovate to elliptical, obtuse; bracts obtuse ..... 15. *A. pumila.*
Leaves lanceolate, acute; bracts acute ..... 16. *A. brandegei.*
Inflorescence not axillary.
All leaves except the uppermost conspicuously petioled.
Plants 1 to 2 meters tall; flowers very large; stems pubescent throughout; leaves cordate, pubescent.
One flower in each involucre; stems and leaves viscid; branches of the inflorescence opposite; petioles, even those of the upper leaves, long ..... 19. *A. viscosa.*
Two or 3 flowers in each involucre; stems and leaves puberulent but not viscid; branches of the inflorescence alternate; petioles shorter, the uppermost leaves almost sessile ..... 20. *A. rotata.*
Plants considerably lower and with much smaller flowers.
Leaves thick, fleshy, and rather rigid; stems pubescent throughout; inflorescence bracteate.
Stems soft-pubescent or puberulent throughout; leaves with long petioles .. 17. *A. pachyphylla.*
Stems hirsute; petioles shorter; leaves larger ..... 18. *A. polytricha.*
Leaves thin and soft; inflorescence seldom bracteate (so in a few species only).
Stems pubescent throughout.
Stems subhirsute below; plant rather slender; leaves lanceolate or lanceovate, rounded or cuneate at the base. 22. *A. greggii.*
Stems not subhirsute below, but puberulent or finely pubescent.
Leaves glabrous; plant tall and stout; leaves broadly ovate or oblong, truncate or rounded at the base ..... 24. *A. gigantea.*
Leaves pubescent.
Leaves ovate, cordate or rounded at the base ..... 23. *A. comata.*
Leaves lanceolate, cuneate or rounded at the base ..... 21. *A. coahuilensis.*
Stems not soft-pubescent or puberulent throughout, mostly glabrous below.
Fruit glabrous; leaves cordate-ovate inflorescence bracteate ..... 31. *A. texensis.*

Fruit not glabrous.
Involucral bracts large, usually 15 mm. or more in diameter when mature, sparingly puberulent or almost glabrous at maturity; upper leaves with evident petioles; stems almost glabrous above.
Leaves ovate, cordate at the base ---- 25. *A. nyctaginea.*
Leaves narrowly ovate to oblong, rounded or cuneate at the base, not cordate ---- 26. *A. floribunda.*
Involucral bracts smaller, when mature less than 15 mm. broad, usually not more than 10 mm., densely pubescent; upper leaves mostly sessile; stems densely pubescent above.
Inflorescence conspicuously bracteate 27. *A. latifolia.*
Inflorescence not conspicuously bracteate.
Bracts broadly ovate, obtuse, puberulent; inflorescence not forming a broad cyme; leaves oblong-lanceolate, rounded at the base, blunt-pointed ---- 28. *A. oblongifolia.*
Bracts elliptical or narrowly ovate, densely hairy; inflorescence mostly broadly cymose.
Stamens 5; stem subhirsute almost throughout; leaves deltoid-ovate to broadly lanceolate ---- 29. *A. pratensis.*
Stamens 5; stem subhirsute below; leaves lanceolate, acute, rounded, or tapering at the base; bracts usually with abundant black hairs ---- 30. *A. melanotricha.*
Leaves sessile or with very short and inconspicuous petioles.
Inflorescence with numerous reduced, bractlike leaves ---- 32. *A. bracteata.*
Inflorescence usually not bracteate.
Stems more or less pubescent below.
Fruit glabrous ---- 37. *A. carletoni.*
Fruit not glabrous.
Stems more or less hirsute.
Stems hirsute throughout; leaves also hirsute, especially on the lower surface, lanceolate; plant very stout ---- 33. *A. hirsuta.*
Stems hirsute only about the nodes; leaves glabrous and narrower; plant more slender ---- 34. *A. pilosa.*

Stems not at all hirsute.	
Stems densely soft-pubescent throughout	35. *A. chersophila.*
Stems rough-puberulent.	
Plant stout; leaves linear-lanceolate, 55 mm. long and 17 mm. wide or less; lobes of the involucre elliptical or ovate, obtuse	42a. *A. pseudaggregata subhirsuta.*
Plant smaller and more slender; leaves linear-lanceolate, 27 mm. long and 5 mm. wide or less; lobes of the involucre lanceolate or elliptical, acute	36. *A. trichodonta.*
Stems glabrous below.	
Fruit glabrous	38. *A. exaltata.*
Fruit not glabrous.	
Lower leaves ovate, rounded at the base	39. *A. sessilifolia.*
Lower leaves lanceolate or linear-lanceolate, narrowed at the base.	
Branches of the inflorescence alternate, forming a cyme; leaves thin, tapering at both ends, more or less pubescent	42. *A. pseudaggregata*
Branches of the inflorescence alternate, forming a panicle.	
Perianth white; leaf blades thin, acute, or acuminate	41. *A. albida.*
Perianth pink; leaf blades thick, blunt-pointed.	
Involucre 3-flowered and 3-fruited	40. *A. lanceolata.*
Involucre 1-flowered and 1-fruited	40a. *A. lanceolata uniflora.*

1. **Allionia coccinea** (Torr.) Standley.

Oxybaphus coccineus Torr. Bot. Mex. Bound. 169. 1859.

Mirabilis coccinea Benth. & Hook. Gen. Pl. **3**: 3. 1880.

Allionia linearis coccinea Jones, Contr. Western Bot. **10**: 51. 1902.

Specimens examined:

NEW MEXICO: Copper mines, *Wright* 1723, type collection; Kingston, 1904, *Metcalfe* 1379; Mangas Springs, 1903, *Metcalfe* 91; Mogollon Creek, 1903, *Metcalfe* 229; Rio Apache, 1892, *Wooton;* 5 miles west of Silver City, 1906, *Wooton;* Silver City, 1880, *Greene;* Burro Mountains, 1880, *Rusby* 354; Eagle Peak, 1900, *Wooton;* Mexican Boundary Survey 1115.

ARIZONA: Bradshaw Mountains, 1892, *Toumey* 482; Putnams, 1890, *Jones;* Prescott, 1894, *Toumey;* Nogales, 1892, *Brandegee;* mouth of Blue River, 1905, *Hough;* Fort Huachuca, 1894, *Wilcox* 207; Fort Rucker, 1879, *R. T. Budd;* Marsatzal Mountains, 1867, *Doctor Smart* 227; Lowell, 1884, *Parish;* Hassayampa Creek, 1865, *Coues & Palmer* 274, 374; Santa Rita Mountains, 1881, *Pringle;* Fort Apache, 1903, *Mayerhoff* 117.

MEXICO: San José Mountains, Sonora, 1893, *Mearns* 1757.

2. **Allionia gracillima** Standley, sp. nov.

Stems 20 to 50 cm. long, from a slender woody root, very slender, much branched, dichotomous, frequently 4 branches from a single node, the branches rather densely interlacing, the plant erect or decumbent, the stems glabrous throughout, more or less glaucous, especially near the nodes; leaf blades thin, linear, acute, bright green, sessile, 10 cm. or less in length; involucres single in the axils of the leaves on filiform pedicels, which are 6 mm. or less in length, the pedicels glabrous or with a few minute, appressed hairs; flowers apparently all cleistogamous; involucres cleft almost to the base, the lobes narrowly elliptical, acutish, finely pubescent, about 4 mm. high; fruit 5.5 mm. or less in length, acutish above, slightly narrowed below with 5 very prominent and thick, obtuse ribs, finely hispidulous.

I first saw this plant in the herbarium of the University of Arizona, but hesitated to describe it, thinking it merely an abnormal form. Later, on examination of the excellent series of specimens of the plant collected by Mr. Blumer, it could be seen that the plant was distinct from its nearest ally, *A. coccinea*. From that species it differs in its more slender and much branched stem, less erect habit, cleistogamous flowers, and the usually single fruit in the involucre; the method of inflorescence, too, is very different.

Type in the herbarium of the New Mexico Agricultural College, collected in the Chiracahua Mountains, Arizona, 1907, *J. C. Blumer* 1769, near Paradise, at an altitude of 1540 to 1880 meters. Also collected at Oracle, Arizona, 1905, *Thornber*.

2a. **Allionia gracillima filifolia** Standley, subsp. nov.

This differs from the species in having smaller and thicker filiform leaves. It also appears to be a smaller plant. The leaves of the species, although narrow, are not filiform but flat.

Type in the herbarium of the New Mexico Agricultural College, collected at Mangas Springs, New Mexico, August 17, 1902, *Wooton*.

2b. **Allionia gracillima scabridata** (Heimerl) Standley.

Mirabilis coccinea scabridata Heimerl, Ann. Cons. et Jard. Genev. 5: 186. 1901.

In the herbarium of the University of Arizona there is a specimen collected in the Santa Rita Mountains, Arizona, 1903, *Thornber* 252, that answers well to the description of Doctor Heimerl's variety, in having its stem and leaves covered with a fine appressed pubescence almost throughout. The type was collected in the Santa Rita Mountains by Pringle. If this plant is the same as the type, and I have little doubt that it is, it is more closely related to *A. gracillima* than to *A. coccinea*, differing from the former chiefly in its pubescence and rather wider leaves.

3. **Allionia petrophila** Standley, sp. nov.

Perennial from a thick root, 50 to 60 cm. high; branches erect, strict; stems sparingly branched, very slender, glabrous except the branches of the inflorescence, which are finely and sparingly puberulent, pale or glaucous; leaf blades linear, 75 mm. long or less, of medium texture, glabrous, acutish, sessile; inflorescence dichotomously cymose, the cymes narrow, few-flowered; involucres on pedicels about 5 mm. long and densely soft-pubescent; involucres about 10 mm. in diameter, the lobes broadly ovate, obtuse, densely soft-pubescent, the lobes as long as the tube or shorter; fruit brown, 4 mm. long, rather obtuse above or acutish, narrowed below, with 5 very thick, tuberculate ribs, the narrow spaces between the ribs tuberculate, glabrous.

Readily distinguished by its glabrous, tuberculate fruit and strict, slender habit. Type in the herbarium of the University of California (sheet 101176), collected on rocky hills near Chihuahua, Mexico, September, 1886, *Pringle* 840.

4. **Allionia glabra** (S. Wats.) Kuntze, Rev. Gen. Pl. 533. 1891.
Oxybaphus glaber S. Wats. Am. Nat. **7**: 301. 1873.

On account of its glabrous fruit and stems this is a very distinct species. The involucres are usually 1-flowered. The type material consisted of merely a few panicles in fruit broken from the ends of the stems, but there is little doubt about the identity of the plant.

Type locality, Kanab, Utah.

Specimens examined:

UTAH: Southern Utah, 1872, *Wm. Thompson* 303.
ARIZONA: Northeastern Arizona, 1896, *Hough* 53.
NEW MEXICO: Mesilla Valley, 1907, *Wooton & Standley* 3895; Mesilla Valley, 1890, *Wooton;* Arroyo Ranch near Roswell, 1903 *Griffiths* 5683; Albuquerque, 1894, *Herrick;* Brockman's Ranch, 1900, *Wooton.*
TEXAS: No locality given, *Havard.*

5. **Allionia linearis** Pursh, Fl. Am. Sept. **2**: 728. 1814.
Calymenia angustifolia Nutt. Gen. N. A. Pl. **1**: 26. 1818.
Oxybaphus angustifolius Sweet, Hort. Brit. **1**: 334. 1826.
Oxybaphus angustifolius linearis Choisy in DC. Prod. **13**^{2}: 433. 1849.
Mirabilis angustifolia MacM. Metasperm. Minn. Val. 216. 1892.
Allionia bushii Britton, Bull. Torr. Club **22**: 223. 1895.
Mirabilis linearis Heimerl, Ann. Cons. et Jard. Genev. **5**: 186. 1901.

This is an exceedingly variable species, and one that is difficult to study from herbarium material. Such material usually does not show the color of the flowers, nor, what is of more importance, the habit of the plant. As it is defined here it is probably a composite species, and some of the specimens should perhaps even be placed in some of the closely related species. Some of the plants are noteworthy because of their bracted inflorescence which has slender and much jointed branches. Whether this form is worthy of separation I have been unable to determine.

Specimens examined in part:

ARIZONA: Base of San Francisco Mountains, 1884, *Lemmon;* mesa west of Buckskin Mountains, 1894, *Jones* 6063b; San Francisco Mountains, 1889, *Knowlton* 178; Walnut Canyon near Flagstaff, 1891, *MacDougal.*
NEW MEXICO: Organ Mountain foothills, 1894, *Wooton;* White Mountains, 1897, *Wooton* 77; Mangas Springs, 1901, *Metcalfe;* Dog Spring, Dog Mountains, 1893, *Mearns* 2421; Sierra Grande, 1903, *Howell* 223; Crawfords, 1906, *Wooton;* Zuni Reservation, 1904, *Wooton* 2830; Raton, 1899, *Cockerell;* Rio Frisco, 1900, *Wooton;* mountains north of Santa Rita, 1900, *Wooton;* Socorro, 1881, *Vasey;* Chiz, 1904, *Wooton* 2828; Roswell, 1900, *Earle* 365; Capitan Mountains, 1900, *Earle* 495; Gila Hot Springs, 1900, *Wooton.*
COLORADO: Colorado Springs, 1892, *C. S. Sheldon* 563; Grand Junction, 1894, *Jones* 5476; Platte River, *Denver,* 1878, *Jones* 668; Durango, 1896, *Tweedy* 591; Fort Collins, 1898, 2150; near Boulder, 1902, *Tweedy* 5208, 5209; Canyon City, 1873, *Brandegee* 437; New Windsor, 1904, *Osterhout,* 2926.
WYOMING: Wheatland, 1894. *A. Nelson* 379; North Fork of the Laramie River near Prayers Crossing, 1899, *Schuchert.*

SOUTH DAKOTA: Near Fort Meade, 1887, *Forwood* 314a, 313; Hot Springs, 1892, *Rydberg* 958; French Creek, 1892, *Rydberg*, 957; White River, 1892, *Wilcox;* Spring Creek Basin, 1891, *T. A. Williams.*

NEBRASKA: Minden, *H. Hapeman;* Beaver Creek, 1893, *F. E. Clements* 2665; Kearney, 1889, *J. H. Holms;* Kearney, 1899, *Pammel;* Republican Valley, 1893, *W. A. Laybourn* 56.

KANSAS: Garden City, 1890, *B. B. Smyth* 193; Riley County, 1895, *J. B. Norton* 421; Caldwell, 1890, *Smyth* 269; Osborne City, 1894, *Shear* 98; Fort Riley, 1892, *Gayle.*

MISSOURI: Wayne, 1900, *Bush* 825 (this is cited by Doctor Rydberg as *A. bracteata*, but it does not seem to be that species, for its leaves are much narrower and thicker and the aspect of the plant is very different).

ILLINOIS: Romeo, 1898, *Umbach.*

OKLAHOMA: Anadarko, 1891, *C. S. Sheldon* 178; Huntsville, 1896, *Laura A. Blankinship;* Limestone Gap, 1877, *Butler.*

TEXAS: Pedernales, *Jermy* 513; 1849, *Wright* 606; Colorado, 1902, *Tracy* 8072; Estelline, 1903, *Reverchon* 3687a; Big Springs, 1902, *Tracy* 8345; San Antonio, *E. H. Wilkinson* 143.

Mr. K. K. Mackenzie writes me that *A. bushii* Britton, which he has seen in its type locality, Jackson County, Missouri, is an artificial form of *A. linearis*, which grows rather commonly along the railroad tracks. When this is cut down by the section men small, depauperate shoots spring up from the stubs that are left, and one of these was described as *A. bushii.*

The following collections could be referred here, if anyone cares to maintain this form as a variety:

MISSOURI: Jackson County, 1893, *Bush.*

KANSAS: Ulysses, 1893, *C. H. Thompson* 58; Kearney County, 1897, *Hitchcock* 421a; Tribune, 1892, *Minnie Reed.*

OKLAHOMA: Near Alva, 1896, *Ward* 70; Sapulpa, 1894, *Bush* 472.

5a. Allionia linearis subhispida (Heimerl) Standley.

Mirabilis linearis subhispida Heimerl, Ann. Cons. et Jard. Genev. **5**: 186. 1901.

This is distinguished from the species by its stem which is more or less hirsute throughout, the pubescence extending to the leaves. It seems to be a smaller plant, too, and is probably a good species, but the author has seen no very good material.

Specimens examined:

NEW MEXICO: Capitan Mountains, 1900, *Earle* 383, type collection; south of San Rafael, 1906, *Wooton;* Atarque, 1906, *Wooton;* Gray, 1898, *Skehan* 100; Magdalena, 1897, *Herrick* 658.

6. Allionia divaricata Rydb. Bull. Torr. Club **29**: 691. 1902.

From *A. linearis* this is distinguished chiefly by its long, thin, acuminate leaves, which are also wider, and by the prominent petioles; from *A. diffusa* by the less pubescent pedunicles, taller and less branched stem, and the petioled leaves; from *A. glandulifera* by its less branched habit, narrower and petioled leaves, and less abundant and different pubescence. The species is also more or less closely related to *A. melanotricha.*

Specimens examined:

COLORADO: Durango, 1898, *Baker, Earle & Tracy* 512a, type collection; Colorado Springs, 1896, *Knowlton* 34; near Florissant, 1905, *Ramaley* 1372; Sapinero, 1898, *H. N. Wheeler* 567; Arkansas River Valley, 1873, *Wolf* 811; Minnehaha, 1901, *Clements* 112; Berwind, 1900, *Jennie M. Archibald;* Sierra Mojada, 1877, *Brandegee;* Manitou, 1885, *Fritchey;* Fort Collins, 1896, *Baker.*

UTAH: Salt Lake City, 1880, *Jones* 1865; Marysvale, 1894, *Jones* 5904e.
NEW MEXICO: Glorieta, 1881, *Vasey;* Santa Fe Canyon, 1897, *Heller* 3848; Chusca, 1883, *C. C. Marsh;* West Fork of the Gila, 1900, *Wooton;* Sandia Mountains, 1898, *Herrick* 1012.
ARIZONA: San Francisco Mountains, 1889, *Knowlton* 11; Flagstaff, 1884, *Jones* 4057; Bill Williams Mountain, 1883, *Rusby* 792; south of Bakers Butte, 1892, *Toumey* 486; San Francisco Mountains, 1884, *Lemmon;* Leroux Spring, 1901, *Leibery* 5845.

7. **Allionia diffusa** Heller, Minn. Bot. Stud. **2**: 33. 1898.

This is a plant that is very difficult to understand and determine from herbarium material. A considerable number of the specimens below referred here may be wrongly determined on this account. The plant is distinguished from *A. linearis* chiefly by its diffuse habit, a character difficult to show in dried specimens.

NEW MEXICO: Ten miles west of Santa Fe, 1897, *Heller* 3740, type collection; Mangas Springs, 1902, *Wooton;* Eagle Creek, White Mountains, 1899, *Turner* 283; Little Mountain, near Las Cruces, 1902, *Metcalfe;* Kingston, 1904, *Metcalfe* 1349; near Carrizozo, 1901, *Wooton;* Albuquerque, 1900, *Winnie Howard* 13; White Mountains, 1897, *Wooton* 240; Sierra Grande, 1903, *A. H. Howell* 232; Santa Fe, 1881, *Engelmann.*
COLORADO: Denver, 1881, *Ward;* eastern Colorado, 1904, *W. S. Cooper* 294; Fort Collins, 1895, *J. H. Cowen* 2147; near Boulder, 1901, *Ramaley* 801; Trinidad, 1892, *Eastwood;* Piedra, 1899, *Baker.*
TEXAS: Limpia Canyon, 1889, *Nealley* 617.
ARIZONA: Plains near Flagstaff, 1900, *Purpus* 8072; Cedar Mountains, 1902, *Purpus;* Tanners Canyon, Huachuca Mountains, 1893, *F. X. Holzner* 567.
WYOMING: Valley of South Stinking Water, 1893, *Rose* 132.

8. **Allionia glandulifera** A. Nelson, Bot. Gaz. **34**: 364. 1902.

Various authorities have stated that this is the same as *A. diffusa.* It certainly resembles that species very closely, but I do not believe that it can be the same. *A. glandulifera* is a larger, rather more branched plant of a much brighter green color. It also seems to be more pubescent and glandular.

Specimens examined:

WYOMING: Head of Woods Creek, Albany County, 1900, *A. Nelson* 8048; plains between Sheridan and Buffalo, 1900, *Tweedy* 5557; Cottonwood Canyon, 1895, *A. Nelson* 1560; Laramie, 1900, *A. Nelson* 7637; Wheatland, 1894, *A. Nelson* 379; Sheridan Experiment Farm, 1895, *J. L. Lewis,* 47.
MONTANA: Sand Coulee, 1885, *R. S. Williams.*
INDEFINITE REGIONS: Near mouth of the Cheyenne River, Upper Missouri, 1839, *Geyer* 67; Yellowstone, 1853–54, *Hayden;* head of the Little Missouri, 1859, *Hayden;* sandy bed of Cheyenne River, 1859, *Hayden.*

9. **Allionia vaseyi** Standley, sp. nov.

Stems low, about 20 cm. high, spreading, much branched, the branching dichotomous, glabrous below or minutely roughened, more or less soft-pubescent above near the ends of the branches; leaf blades linear, sessile, thick and fleshy, slightly or somewhat pilose on the lower surfaces; involucres axillary or a few clustered at the ends of the branches, short-pediceled, the pedicels being shorter than the involucres, about 10 mm. wide and 7 mm. high, the lobes elliptical or even lanceolate, acute, covered by rather long, soft, matted hairs;

fruit about 4.5 mm. long, obtuse above, considerably narrowed below, with wide, smooth ribs, the narrow spaces between the ribs tuberculate, puberulent.

The differently formed fruit, pubescent leaves, and more pubescent involucres separate this plant from *A. bodini*. Type in the herbarium of Field Museum of Natural History (no. 161591), collected at El Paso, Tex., 1881, *Vasey*.

10. **Allionia bodini** (Holzinger) Morong, Mem. Torr. Club **5**: 354. 1894.
Oxybaphus bodini Holzinger, Contr. Nat. Herb. **1**: 287. 1893.

Specimens examined:

COLORADO: Pueblo, 1890, *Bodin* 236, type; Fort Collins, 1895, *J. H. Cowen* 2129; Canyon City, 1873, *Brandegee* 324; New Windsor, 1905, *Osterhout* 190.
SOUTH DAKOTA: Near Fort Meade, 1887, *Forwood* 314.
UTAH: Rabbit Valley, 1875, *Ward* 565; near Price, 1894, *Jones* 460a.
TEXAS: 1849, *Wright*.
KANSAS: Seward County, 1888, *H. W. Norris* 103.
ARIZONA: Base of the San Francisco Mountains, 1884, *Lemmon*.
WYOMING: Between Sheridan and Buffalo, 1900, *Tweedy* 5536.

11. **Allionia pinetorum** Standley, sp. nov.

Perennial from a thick, fleshy root about 18 mm. thick or less; stems few from each root, rarely more than 2, 35 cm. or less in height, very slender, simple or very sparingly branched, glabrous below, very minutely soft-puberulent above; leaves sessile, narrowly linear, thin, 65 mm. long and 3 mm. wide or less, sharp-pointed, glabrous, divaricate or ascending; inflorescence axillary or of small, loose, terminal, few-flowered cymes; involucres on pubescent pedicels 8 mm. long or less; upper leaves sometimes reduced to bracts; involucres 8 mm. wide and 6 mm. high or less, the lobes elliptical or oblong, obtuse, rather densely soft-puberulent; flowers apparently all cleistogamous; fruit 3.5 mm. long, inconspicuously 5-angled, very minutely and sparingly hispidulous.

This is perhaps as closely related to *A. bodini* as to any species, but it is a much more slender, less branched plant, its leaves narrower and thinner. Type collected at Gilmore's Ranch, on Eagle Creek, White Mountains, New Mexico, August, 1907, *Wooton & Standley* 3896, growing on a rather dry hillside with a southern exposure, under pine trees; altitude about 2,270 meters. Type in the herbarium of the New Mexico Agricultural College.

12. **Allionia aggregata** (Ortega) Spreng. Syst. **1**: 384. 1825.
Calyxhymenia aggregata Ortega, Nov. Rar. Pl. **8**: *pl. 11*. 1798.
Oxybaphus aggregatus Vahl, Enum. **2**: 41. 1806, in part.

Specimens examined:

WYOMING: Whalen Canyon, 1894, *A. Nelson* 4014.
NORTH DAKOTA: Lisbon, 1891.
MISSOURI: No locality given, 1883, *Bush*.
NEBRASKA: Fort Clark, 1855, *Hayden*.

One sheet collected by Wright, 1851–52, no number, in the National Herbarium belongs here.

13. **Allionia decumbens** (Nutt.) Spreng. Syst. **1**: 384. 1825.
Mirabilis aggregata Cav. Ic. **5**: 22. *t. 437*. 1799.
Oxybaphus aggregatus Vahl. Enum. **2**: 41. 1806, in part.
Calymenia decumbens Nutt. Gen. N. A. Pl. **1**: 26. 1818.
Oxybaphus decumbens Sweet, Hort. Brit. **1**: 334. 1826.

Oxybaphus angustifolius decumbens Choisy in DC. Prod. 13²: 443. 1849.

Type locality, "On high, bare, gravelly hills near Fort Mandan on the Missouri."

Specimens examined:

MISSOURI: Little Blue Tank, Jackson County, *Bush* 183; Independence, 1894, *Bush* 486; Swan, 1898, *Bush* 237; Independence, 1882, *Bush* 3; Allenton, 1875, *Letterman;* Potosi, 1861, *F. Peck;* Jackson County, 1892, *Bush* 2097.

TEXAS: Bexar County, *Jermy* 125.

NORTH DAKOTA: Medora, 1891, *H. L. Bolley* 1311.

COLORADO: Canyon City, 1873, *Brandegee* 700.

14. **Allionia ciliata** Standley, sp. nov.

Oxybaphus aggregatus Torr. Bot. Mex. Bound. 168. 1858, not Vahl.

Plant low, 20 cm. high, erect, abundantly dichotomous-branched, especially near the base; stems angled, at least when dry, glabrous below, with a few scattered, weak hairs above; leaf blades linear-lanceolate, thin, blunt-pointed, rounded, cuneate, or attenuate at the base, the margins very irregular and with a few conspicuous long, soft, white hairs, a few such hairs scattered over the surfaces of the leaves as well; petioles 7 mm. long or less, with a few hairs like those on the blades; inflorescence axillary or a few of the involucres clustered at the ends of the branches; involucres short-pediceled, the pedicels rather densely long-pubescent, not at all viscid; involucres about 10 mm. wide and 8 or 9 mm. high, the lobes about as long as the tube, acutish, sparingly puberulent or glabrous, ciliolate-margined; fruit 4 mm. long, brown, rather obtuse above, slightly narrowed below, 5-ribbed, the ribs thick and more or less tuberculate, the narrow spaces between them also tuberculate, glabrous.

The plant in habit suggests *A. brandegei* or *A. pumila*, but its almost glabrous stem and different pubescence at once distinguish it. Type U. S. National Herbarium no. 22690, cotype in the herbarium of the Missouri Botanical Garden; collected at Smith's Run, western Texas, 1851–52, *Wright* 1717

The specific name above adopted was used by Professor Heimerl in herbarium under Mirabilis.

15. **Allionia pumila** Standley, sp. nov.

Plant low, about 12 cm. high, much branched from a thick, woody root, the stems sparingly branched; stems rather slender, densely soft-pubescent; leaf blades ovate or oblong, small, 25 mm. long and 16 mm. wide or less, obtuse or rounded at the apex, rounded or mostly somewhat attenuate at the base, rather thick but soft, finely puberulent on both surfaces, yellowish-green; petioles slender, pubescent, mostly as long as the blades or longer, some of the uppermost a little shorter; involucres solitary in the axils of the leaves, drooping on short, densely pubescent pedicels; bracts ovate, obtuse, densely soft-pubescent, 10 mm. or less in diameter, about 5 to 6 mm. high; fruit not seen.

A very distinct species on account of its low, dense habit, finely pubescent stems, and long petioles. It is as closely related to *A. aggregata* as to any species, but is different in habit and pubescence. Doctor Heimerl in the National Herbarium has labeled it *A. pilosa* (A. Gray) (*A. comata* Small), but the latter is a much larger plant with quite different inflorescence. Type U. S. National Herbarium no. 22757, collected at Kingman, Arizona, June, 1884, *J. G. Lemmon & Mrs. Lemmon.* Also collected at Castle Creek, Arizona, 1892, *Toumey* 484.

16. **Allionia brandegei** Standley, sp. nov.

Perennial from a very thick and woody root; stems many from each root, 18 cm. high or less, erect or spreading, viscid-pubescent throughout, densely so above; stems mostly simple, sometimes sparingly branched; leaf blades lanceolate, 35 mm. long and 14 mm. wide or less, thick, densely viscid-puberulent on both surfaces, attenuate toward the apex, cuneate or attenuate at the base; petioles one-half as long as the blades or usually less, those of the uppermost blades very short, densely viscid-pubescent; involucres few, axillary, not more than 1 at any single node, about 13 mm. in diameter and 10 mm. high, the bracts ovate or triangular-ovate, acute, longer than the tube, densely puberulent within and without, thick; fruit 6 mm. long, dark olive, acutish, with 4 or 5 low, more or less tuberculate ribs, the spaces between the ribs also tuberculate, very sparingly puberulent, some of the fruits even glabrous; flowers not seen but probably cleistogamous.

This is most like *A. pumila*, but its leaves are thicker and more densely pubescent and of a different shape, the petioles shorter, and the lobes of the involucre more acute. Type in the herbarium of the University of California (no. 10164), collected in the Providence Mountains, California, June 2, 1902, *Brandegee*. Purpus's 5905 from Highland Peak, Nevada, seems to be a glabrate form of this; aside from its less abundant pubescence it does not seem to differ, and is probably merely an older plant.

17. **Allionia pachyphylla** Standley, sp. nov.

Low, 30 cm. high or less, from a woody root; stems stout, much branched, with short internodes, low and more or less spreading; stems with abundant, rather hispid pubescence throughout; leaf blades ovate, obtuse, truncate, or subcordate at the base or sometimes attenuate, thick, more or less puberulent on both surfaces, paler beneath; petioles of the lowest leaves almost as long as the blades, becoming shorter above, the uppermost leaves almost sessile, the petioles stout; inflorescence subcymose, of few branches, the branches with conspicuous, broadly ovate, thick bracts, densely pubescent; involucres on short, densely pubescent pedicels, about 1 cm. in diameter, their lobes ovate and densely pubescent; fruit 5 mm. long, acutish above, prominently 5-ribbed, very finely puberulent.

A very distinct species referred to *A. pilosa* (Gray), from which it is quite different in habit; its leaves, too, are much thicker, and the fruit more acute. Type U. S. National Herbarium no. 211717, collected in Arizona at the Grand Canyon, 1892, *Toumey* 485; cotype in the herbarium of the University of Arizona.

Other specimens seen:

ARIZONA: Red Canyon Trail, Grand Canyon, 1901, *Ward;* Grand Canyon, 1892, *Wooton;* Camp Verde, 1891, *MacDougal.*

18. **Allionia polytricha** Standley, sp. nov.

Erect from a rather thick and woody root; stems sparingly branched, stout, hirsute below, the branches of the inflorescence soft-pubescent; leaf blades ovate, the uppermost rather narrowly so, thick, glabrous or sparingly pilose, obtuse or rounded at the apex, rounded or truncate at the base, large, 7 cm. long and 5 cm. wide or less; petioles stout, those of the lowest leaves one-third as long as the blades, the uppermost leaves sessile; inflorescence sparingly dichotomous-branched, the branches with numerous bract-like, much reduced, thick, puberulent leaves; involucres short-pediceled or almost sessile, about 10 mm. wide, the bracts thick, broadly ovate, obtuse, 6 mm. high, more or less

densely soft-pubescent; fruit clavate, minutely strigose, rather obtuse above, 4 or 5 mm. long.

This is not likely to be confused with any species except *A. pachyphylla*. It is distinguished from that species by its larger leaves and hirsute pubescence; the stem, too, is less branched. Type in the herbarium of the University of California (no. 101182) collected at Canyon City, Colo., August 13, 1872, *Brandegee* 437. In the same herbarium there is a second specimen collected in the same locality, July 28, 1873, *Brandegee*, 702.

19. **Allionia viscosa** (Cav.) Kuntze, Rev. Gen. Pl. 533. 1891.

Mirabilis viscosa Cav. Ic. Pl. 1: 13. 1791.
Calyxhymenia viscosa Ortega, Nov. Rar. Pl. Hort. Matr. 1: 6. 1797.
Calymenia viscosa Pers. Syn. 1: 36. 1805.
Vitmania viscosa Turra; Steud. Nom. 140. 1821. as synonym.
Oxybaphus viscosus L'Her.; Choisy in DC. Prod. 13²: 430. 1849.

Specimens examined:

MEXICO: Near Tehuacan, Puebla, *Pringle* 8600; Ixmiquilpan, Hidalgo, 1905, *Purpus* 1435; near Tula, Hidalgo, 1902, *Pringle;* Tehuacan, 1841, *Liebmann.*

20. **Allionia rotata** Standley, sp. nov.

Plant probably tall (there are only the ends of branches upon the sheets); stems sparingly puberulent throughout but not viscid, almost glabrous below, sparingly branched, the branching mostly dichotomous; leaf blades ovate, obtuse, cordate at the base, glabrous or the uppermost more or less puberulent; petioles very short, the uppermost leaves sessile; inflorescence subcymose, its branches slender and covered with much reduced, bract-like leaves; involucres on slender pedicels 7 mm. long or less, when mature circular in outline or scarcely lobed, sparingly soft-puberulent, about 25 mm. in diameter, ciliolate; fruit 4 mm. long, much narrowed below, obtuse above, 5-ribbed, prominently transversely ridged or tuberculate, glabrous or minutely puberulent.

From *A. viscosa* the plant is distinguished by its less pubescent and not viscid stems and leaves, shorter petioles, alternate branching, and more tuberculate fruit. The plant has also 2 or 3 flowers and fruits in each involucre while *A. viscosa* has uniformly only one. Type in the herbarium of the Missouri Botanical Garden, collected at Azufrora near Saltillo, Mexico, September 22, 1848, *Gregg* 511.

21. **Allionia coahuilensis** Standley, sp. nov.

Stems stout, erect, about 1 meter high, pale below, darker above, with more or less abundant, short, soft pubescence below which becomes more dense above; leaf blades lanceolate, 50 mm. long and 17 mm. wide or less, cuneate or rounded at the base, blunt-pointed, of medium thickness, densely soft-pubescent on both surfaces, the margins irregular, all leaves except those of the inflorescence with conspicuous petioles 20 mm. long or less; inflorescence paniculate, its branches stout, opposite, very densely viscid-pubescent throughout, the hairs rather long and spreading; branches of the inflorescence with conspicuous, much-reduced, bract-like leaves, these 5 mm. long or less, ovate, densely viscid-pubescent; involucres 12 mm. wide or less and about 8 mm. high, glandular-villous, on short glandular-villous, often bracted pedicels; lobes of the involucre broadly ovate or orbicular, broadly obtuse, short; fruit 4 mm. long, obtuse above, slightly narrowed below, with 5 smooth, rather prominent ribs, the spaces between them transversely rugulose and hirtellous.

This somewhat resembles *A. pseudaggregata*, but is a larger plant, with pubescent stems and more densely pubescent inflorescence, the pubescence being also of a different character; the leaves, too, are prominently petioled, while those of *A. pseudaggregata* are mostly sessile, and the inflorescence is paniculate rather than dichotomously branched as it is in the latter species. Type in the herbarium of the University of California, collected at Saltillo, Coahuila, Mexico, 1898, *Palmer* 158.

22. **Allionia greggii** Standley, sp. nov.

Stems erect, rather slender, more or less subhirsute below, densely glandular-pubescent above, the branching dichotomous; leaf blades lanceolate or lance-ovate, mostly blunt-pointed but some of them acutish, rounded or cuneate at the base, glabrous; petioles one-half as long as the blades, sparingly subhirsute, the uppermost leaves sessile; inflorescence congested, subcymose; involucres short-pediceled, the lobes ovate, acute, densely covered with matted hairs, 3-flowered; fruit 4 mm. long, with 5 thick but low ribs, not tuberculate, sparingly puberulent.

The smooth and puberulent fruit, obtuse and narrower leaves which are not cordate at the base, and 3-flowered involucres separate this from *A. glabrifolia*. From *A. pseudaggregata* it is readily distinguished by the blunt, petioled leaves and more pubescent stem. Type in the herbarium of the Missouri Botanical Garden, collected at San Antonio, near Saltillo, Mexico, September 1, 1848, *Gregg* 394b, 348, 394.

23. **Allionia comata** Small, Fl. Southeast. U. S. 407. 1903.

Oxybaphus nyctagineus pilosus A. Gray, Bot. Mex. Bound. 174. 1859, not *Allionia pilosa* Nutt.

Specimens examined:

TEXAS?: *Wright* 1718, type collection.

NEW MEXICO: Silver City, 1880, *Greene, Rusby* 353; Magdalena, 1897, *Herrick* 657.

ARIZONA: Prescott, 1894, *Toumey*; Santa Rita Mountains, 1880, *Engelmann*.

24. **Allionia gigantea** Standley, sp. nov.

Stems erect, simple below or sparingly branched, very stout and tall, probably considerably over 1 meter in height, softly appressed-puberulent throughout; leaf blades thick, the lower ones large, 10.5 cm. long and 8 cm. wide or less, broadly ovate, obtuse, truncate at the base, almost sessile; the upper leaves oblong, 8.5 cm. long and 4.5 cm. broad or less, obtuse, broadly cuneate or rounded at the base, prominently veined, short-petioled, the uppermost ones sessile; inflorescence paniculate, its branches opposite; involucres on pedicels 10 mm. long or less, 10 mm. wide, and about 7 mm. high, the lobes broadly ovate, obtuse, densely and finely puberulent; flowers about 10 mm. long, the stamens slightly exserted; fruit 5 mm. long, 5-ribbed, the ribs tuberculate, the spaces between them puberulent, acutish above, somewhat narrowed below.

The large size, thick and peculiarly shaped leaves, small involucres, and pubescent stem separate this plant from *A. floribunda* and *A. nyctaginea*, to which it is most closely related. Type and duplicate in the herbarium of the Missouri Botanical Garden, collected in Texas, on sands at Buzzards Spring, August 1, 1902, *Reverchon*. It was also collected by the same collector on sands at Handley, October 3, 1902.

Tracy's 8342 from Weatherford, 1902, seems to be the same plant at a more mature stage; its involucres are larger, about 16 mm. wide and 10 mm. high. The plant is rather smaller, but it has the peculiar leaves and pubescent stems of the type.

25. **Allionia nyctaginea** Michx. Fl. Bor. Am. **1**: 100. 1807.

Calymenia nyctaginea Nutt. Gen. N. A. Pl. 26. 1818.

Oxybaphus nyctagineus Sweet, Hort. Brit. **1**: 224. 1825.

Mirabilis nyctaginea MacM. Metasperm. Minn. Val. 217. 1892.

Doctor Heimerl[a] places also as a synonym of this species *O. cervantesii grandifolius* Choisy in DC. Prod. **13**[2]: 433.

Type locality, "Ad ripas fluminis Tennessee."

Specimens examined in part:

COLORADO: New Windsor, 1906, *Osterhout* 3454; Boulder, 1905, *Ramaley* 1103; Boulder, 1902, *Tweedy* 5215, 5214; Canyon City, 1873, *Brandegee* 701; Fort Collins, 1896, *Crandall* 2131.

WYOMING: Badger, 1901, *E. Nelson* 687; Green Mountain, 1896, *A. Nelson* 2224; Fairbanks, 1894, *A. Nelson* 3072; Laramie Peak, 1864, *R. B. Hetz.*

MONTANA: Clear Creek, 18 miles above Glendive, 1883, *Ward;* Calais, 1900, *Blankinship.*

NORTH DAKOTA: Leeds, 1902, *Lunell.*

SOUTH DAKOTA: Hot Springs, 1892, *Rydberg* 953.

NEBRASKA: Gage County, 1882, *W. C. Knight;* Lancaster County, 1882, *Knight;* Sheridan County, 1886, *J. B. Hatcher;* Newcastle, 1893, *F. Clements* 2607; near Mullen, 1893, *Rydberg* 1496; Lincoln, 1887, *H. J. Webber;* Franklin, 1893, *W. A. Laybourn* 19.

IOWA: Tama, 1907, *Conard* 678; Decatur County, 1903, *J. P. Anderson;* near Council Bluffs, 1839, *Geyer* 65; Fayette County, 1893, *B. Fink* 571; Iowa City, *A. S. Hitchcock.*

MINNESOTA: Nicollet, 1892, *C. A. Ballard;* Minneapolis Falls, 1891, *Sandberg* 945; Hennepin County, 1889, *Sandberg;* Winona, 1888, *Holzinger;* Minneapolis, 1891, *Redfield;* Bemidji, 1902, *C. J. Brand* 593.

WISCONSIN: Kilbourn, 1895, *H. P. Chandler;* Madison, 1889, *Trelease.*

ILLINOIS: Peoria, 1894, *F. E. McDonald;* Princeville, 1897, *V. H. Chase;* Chicago, 1898, *N. L. T. Nelson;* Naperville, 1897, *Umbach;* Oquawka, 1873, *H. N. Patterson;* River Forest, 1896, *A. Chase;* Lisle, 1898, *Umbach;* Cahokia Mound, 1878, *Ward;* Oak Park, 1887, *G. L. Thayer;* Beardstown, *Geyer;* Athens, 1863, *E. Hall;* Fountaindale, *Bebb;* Hinsdale, 1902, *E. C. Smith* 653; Berwyn, 1907, *W. W. Calkins* 192.

INDIANA: Roby, 1907, *O. E. Lansing* 2674.

TENNESSEE: Nashville, 1878, *Gattinger.*

TEXAS: Terrell, 1904, *F. J. Tyler;* Dallas County, 1876, *Reverchon* 789; Cedar Spring, 1902, *Reverchon.*

OKLAHOMA: Woodward County, 1900, *P. J. White;* on the False Washita, between Fort Cobb and Fort Arbuckle, 1868, *Palmer* 273.

KANSAS: Riley County, 1895, *J. B. Norton* 420; Osborne City, 1894, *C. L. Shear* 44; Manhattan, 1892, *Norton;* Manhattan, 1887, *Kellerman.*

MISSOURI: St. Louis, *Glatfelter;* Sheffield, 1899, *Bush* 306; Jefferson Barracks, 1890; Cooley's Lake, 1894, *Cameron Mann.*

MASSACHUSETTS: Cambridge, escaped near the Botanic Garden, 1878, *Kellerman.*

In the herbarium of the Missouri Botanical Garden there is a sheet of this species with an old label "*Oxybaphus nyctaginia* Nuttall. *Tennassee ad ripas.*" It is barely possible that this may be one of the specimens from which the plant was first described, for this is the locality given with the original description.

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[a]Ann. Cons. et Jard. Genev. **5**: 181, 1901.

26. **Allionia floribunda** (Choisy) Kuntze, Rev. Gen. Pl. 533. 1891.

Allionia orata Pursh, Fl. Am. Sept. 1: 97. 1814, not *Oxybaphus ovatus* Vahl. 1806.

Oxybaphus floribundus Choisy in DC. Prod. **13**[2]: 433. 1849.

Allionia nyctaginea ovata Morong, Mem. Torr. Club **5**: 146. 1894.

Doctor Heimerl[a] also gives the following as synonyms of this species:

Calyxhymenia paniculata Desf. Cat. Hort. Par. III. 390. 1829.

Oxybaphus glabrifolius minor Choisy in DC. Prod. **13**[2]: 431. 1849.

Allionia cucullata Mey.; Fisch. Mey. & Avé-Lall. Ind. Sem. Hort. Petrop. 9. 1844; Animadv. **8**: 55.

Oxybaphus cucullatus Choisy, loc. cit. 434.

It is questionable whether this should be maintained as a species or reduced to a variety of *A. nyctaginea;* both treatments have been given it by various authors. The northern plant, the typical form, seems to vary from *A. nyctaginea* principally in the shape of the leaves, certainly not a very good specific difference. In Texas, however, shading gradually into the northern form, there is a plant which is very different from *A. nyctaginea.* Not only are its leaves different in shape, but the plant is much more slender in every part, and there are other differences. This plant, I think, certainly deserves specific rank, and it is so closely related to *A. floribunda* that I have thought it better to include it here under that name rather than give it a new name.

Specimens examined:

OKLAHOMA: Terlton, 1896, *Ward* 34; Sapulpa, 1894, *Bush* 469.

TEXAS: Comanche Plains, 1853, *Bigelow;* Austin, 1872, *E. Hall* 531; Kerrville, 1894, *Heller* 1757; Bonham, *Mrs. J. M. Milligan;* New Braunfels, 1850, *Wright;* Lampasas, *Joor;* Bexar County, *Jermy* 79; Gillespie County, *Jermy* 77.

MINNESOTA: Saint Cloud, 1892, *F. W. Dewart.*

COLORADO: New Windsor, 1897, *Osterhout;* Denver, 1872, *Redfield.*

WYOMING: Plumbago Canyon, 1899, *Schuchert.*

SOUTH DAKOTA: Near Fort Meade, 1887, *Forwood* 316.

IOWA: DeWitt, 1898, *Pammel.*

MISSOURI: Sulphur Springs, Jefferson County, 1898, *Trelease* 1163; Carroll County, 1890, *Bush* 2087; Clarke County, 1892, *Bush* 2084; road from St. Louis to Waterloo, 1844, *Engelmann.*

ALABAMA: Blount County, 1884, *J. D. Smith.*

NEBRASKA: Lincoln, 1887, *H. J. Webber.*

27. **Allionia latifolia** (A. Gray) Standley.

Oxybaphus nyctagineus latifolius A. Gray, Bot. Mex. Bound. 174. 1859.

A species distinguished by its bracteate inflorescence from the other members of the group to which it belongs.

Specimens examined:

TEXAS: 1849, Wright 603, type collection; Mexican Boundary Survey 1112, probably Texan.

28. **Allionia oblongifolia** (A. Gray) Small, Fl. Southeast. U. S. 407. 1903.

Oxybaphus nyctagineus oblongifolius A. Gray, Bot. Mex. Bound. 174. 1859.

Mirabilis oblongifolia Heimerl, Ann. Cons. et Jard. Genev. **5**: 181. 1901.

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[a] Ann. Cons. et Jard. Genev. 5: 181. 1901.

This is very closely related to *A. floribunda* and perhaps hardly separable from it. Doctor Heimerl confused another and different plant with the type of Doctor Gray's variety.

Specimens examined:

TEXAS: 1849, *Wright* 604, type collection; Houston, 1842, *Lindheimer*.

29. **Allionia pratensis** Standley, sp. nov.

Root perennial, long and slender; stems much branched from near the base, sparingly dichotomous above, erect or ascending, about 40 cm. high, more or less densely subhispid or subpilose throughout, the uppermost branches densely so, the hairs more scattered below; leaf blades deltoid-ovate to broadly lanceolate, 4.5 cm. long, 3 cm. wide or less, obtuse or the uppermost acute, the lower ones glabrous, the upper more or less pubescent; petioles as long as the blades or longer, the uppermost blades sessile; inflorescence cymose, rather dense, its branches densely puberulent; involucres on pedicels 10 mm. long or less, about 9 mm. wide and 7 mm. high or less, the lobes elliptical or ovate, obtuse or acutish, densely covered with rather long, soft, pale hairs, the free portion as long as the tube or longer; perianth about 12 mm. long and 17 mm. wide, rose-purple; stamens 5, exserted; fruit 4 mm. long, obtuse, 5-ribbed, the ribs low and almost smooth, the spaces between them smooth and minutely hispidulous.

Although rather closely related to *A. melanotricha*, this plant seems amply distinct. Its flowers are broader, the stamens more numerous, the pubescence much more abundant, the petioles longer, the leaves broader and more numerous, the plant lower and lacking the black hairs found upon the involucres of the latter species. Type in the herbarium of the New Mexico Agricultural College, collected at Barfoot Park, in the Chiracahua Mountains, Arizona, 1907, *Blumer* 1384.

30. **Allionia melanotricha** Standley, sp. nov.

Oxybaphus nyctagineus cervantesii A. Gray, Bot. Mex. Bound. 174. 1859, in part at least; not *O. cervantesii* Lag.

Stems erect, abundantly dichotomous-branched, about 60 cm. high, glabrous except the branches of the inflorescence, these rather closely covered with moderately stiff, rather spreading viscid pubescence; leaf blades lanceolate, 8 cm. long and 3 cm. wide or less, bright yellowish-green, attenuate at the apex, broadly cuneate or rounded at the base, glabrous except the sparingly ciliolate margins; petioles one-half as long as the blades or shorter, those of the uppermost leaves very short; inflorescence cymose; involucres numerous on short, densely pubescent pedicels, not more than 8 mm. broad and 6 mm. high, densely covered with short, soft hairs, these light-colored along the margins of the lobes but black elsewhere, the lobes oblong, rounded at the apex, twice as long as the tube; flowers about 16 mm. long and 12 mm. wide, bright rose-purple; stamens 3, exserted; fruit about 3 mm. long, with 4 or 5 narrow, tuberculate ribs, the smooth surfaces between them sparingly puberulent.

Docter Heimerl in his notes which are attached to the sheets in the National Herbarium has called this *A. oblongifolia*, but the specimens of the type collection of that species in the National Herbarium and the Missouri Botanical Garden are of very different plants. The two differ in the form of the leaves, in their pubescence and their inflorescence, and in the size of their involucres. This is the plant called by Doctor Gray *Oxybaphus nyctagineus cervantesii*, but it is different from *A. cervantesii* and certainly not very closely related to *A. nyctaginea*. Type in the herbarium of the New Mexico Agricultural College,

collected at Barfoot Park, in the Chiracahua Mountains, Arizona, 1907, *Blumer* 1385; altitude about 2,425 meters.

With regard to this and the preceding species, Mr. Blumer writes: "Nos. 147 and 148 are perfectly distinct in the field, though collected within a stone's throw of each other—you need have no hesitancy about that. The new one (*A. pratensis*) is a cespitose plant and the flowers open wider. That the flowers are larger and the leaves very different you can see by the specimens. In all of my Barfoot Park specimens I made it a point, if possible, to represent in my gathering the range of variation of the species, and I remember that in this case there was no suggestion of intergrades."

The following should probably be included here, although they have broader leaves, frequently with cordate bases:

ARIZONA: Canyon east side of San Luis Mountains, 1893, *Mearns* 2199; base of San Luis Mountains, 1893, *Mearns* 2153; Fort Huachuca, 1894, *Wilcox* 400, 298; Rincon Mountains, 1891, *Nealley* 146.

MEXICO: San José Mountains, Sonora, 1893, *Mearns* 1761; Coahuila or Nuevo Leon, 1880, *Palmer* 1111; Colonia Garcia, Chihuahua, 1899, *Townsend & Barber* 244.

NEW MEXICO: Pecos, 1904, *Mrs. Florence Bartlett;* Kingston, 1904, *Metcalfe* 1260; Beulah, 1899, *Cockerell;* Chama, 1899, *Baker* 303; Mogollon Creek, 1903, *Metcalfe* 664; Organ Mountains, 1897, *Tinsley;* White Mountains, 1897, *Wooton* 221; White Mountain Peak, 1901, *Wooton;* Little Creek, White Mountains, 1899, *Turner* 102; Capitan Mountains, 1900, *Earle* 195; Upper Rio Pecos, 1898, *Maltby & Coghill* 164; Cold Spring Canyon, Sacramento Mountains, 1899, *Wooton.*

31. **Allionia texensis** (Coulter) Small, Fl. Southeast. U. S. 406. 1903.

Oxybaphus glabrifolius Torr. Bot. Mex. Bound. 168. 1859, not Vahl.
Allionia corymbosa texensis Coulter. Contr. Nat. Herb. **2**: 351. 1894.

Specimen examined:

TEXAS: *Wright* 605, type collection.

32. **Allionia bracteata** Rydb. Bull. Torr. Club **29**: 690. 1902.

This, as defined by Doctor Rydberg, seems to be a composite species and would probably bear division into two or more. I have seen nothing that exactly matches the type collection.

Specimens examined:

MISSOURI: Malden, 1894, *Bush* 459, type collection; Poplar Bluff, 1897, *Savage & Stull* 932; Springfield, 1892, *F. W. Dewart* 35; Malden, 1893, *Bush;* McDonald County, 1893, *Bush.*

OKLAHOMA: Osage Nation, 1895, *Kimmons;* on the False Washita between Fort Cobb and Fort Arbuckle, 1868, *Palmer* 272; Cherokee Outlet, 1891, *Carleton* 501.

ALABAMA: Selma, 1888, *McCarthy.*

TEXAS: Dallas, 1879, *Reverchon* 787; Dallas, 1880, *Reverchon* 790; Fort Worth, 1891, *Bodin* 237; Palestine, 1884, *Joor.*

TENNESSEE: Nashville, *Gattinger.*

33. **Allionia hirsuta** Pursh, Fl. Am. Sept. **2**: 728. 1814.

Calymenia hirsuta Nutt. Gen. N. A. Pl. 26. 1818.
Oxybaphus hirsutus Sweet, Hort. Brit. **1**: 334. 1825.
Mirabilis hirsuta MacM. Metasperm. Minn. Val. 217. 1892.

Specimens examined:

NEW MEXICO: Raton Mountains, 1903, *Griffiths* 5458.

COLORADO: Colorado Springs, 1884, *Letterman* 214; Wet Mountain Valley, 1873, *Brandegee* 699; near Boulder, 1902, *Tweedy* 5212; near Golden, 1878, *Jones* 677; Manitou Springs, 1881, *Engelmann;* Manitou, 1891, *Trelease.*

WYOMING: Pine Bluffs, 1897, *A. Nelson* 3617; Pikes Peak, 1901, *A. Nelson* 8622.

NORTH DAKOTA: Maza, 1900, *J. Kildahl* 3.

SOUTH DAKOTA: Custer, 1892, *Rydberg* 954; near Fort Meade, 1887, *Forwood* 315; Big Stone, 1892, *T. A. Williams;* Brookings County, 1904, *A. G. Johnson.*

NEBRASKA: Near Mullen, 1893, *Rydberg* 1433; forks of Middle Loup River, 1893, *Rydberg* 1810; Ainsworth, 1893, *F. E. Clements* 2922; forks of Dismal River, 1893, *Rydberg* 1509; Cherry County, 1892, *Smith & Pound* 143; War Bonnet, 1890, *T. A. Williams.*

MINNESOTA: Near Minneapolis, 1891, *G. B. Aiton.*

OKLAHOMA: Fort Sill, 1891, *C. S. Sheldon* 245; Greer County, 1901, *P. J. White.*

33a. **Allionia hirsuta coloradensis** Standley, subsp. nov.

Stems erect, stout, pilose throughout, sparingly branched, the branches opposite; leaf blades lanceolate-oblong, 8 cm. long and 2.7 cm. wide or less, some of the uppermost blades ovate, mostly obtuse or rounded at the apex, rounded at the base, the lower ones with short but distinct petioles, the upper sessile, soft-pubescent or pilose on both surfaces or sometimes almost glabrous, thin and soft, the leaves spreading; inflorescence panicled, its branches opposite and soft-pubescent, leafy, the reduced leaves oblong and rounded at each end, the branches with many glandular hairs among the pubescence; involucres on pedicels 10 mm. long or less, about 12 mm. in diameter and 7 mm. high, the lobes ovate, obtuse, soft-pubescent; flowers 10 mm. long, rose-purple; stamens 3, scarcely exserted, the style long-exserted; fruit 4 mm. long, rather obtuse, 5-ribbed, the ribs smooth but the spaces between them strongly tuberculate, sparingly and minutely hispidulous.

Type in the herbarium of the Missouri Botanical Garden, collected at Manitou, Colo., August 20, 1885, *Fritchey* 28. Readily distinguished from the species by the soft, divaricate leaves which are not acute and not as much wider at the base as those of the species, by the soft pubescence, and more leafy inflorescence.

Other specimens examined:

COLORADO: Manitou, 1901, *Clements* 36; *Hall & Harbour* 483.

34. **Allionia pilosa** (Nutt.) Rydb. Bull. Torr. Club **29**: 690. 1902.

Calymenia pilosa Nutt. Gen. N. A. Pl. **1**: 26. 1818.

Oxybaphus pilosus Sweet, Hort. Brit. 1: 334. 1825.

Oxybaphus hirsutus integrifolius Choisy in DC. Prod. **13**^{2}: 433. 1849.

Type locality, "Near the Missouri, around the Arikaree village, etc."

Specimens examined:

SOUTH DAKOTA: Near Fort Meade, 1887, *Forwood* 315, in part; Pearl Creek, Beadle County, 1894, *Thornber;* Rochford, 1892, *Rydberg* 955.

NORTH DAKOTA: Near Dunseith, 1907, *Lunell;* Pleasant Lake, 1904, *Lunell;* Butte, 1904, *Lunell;* Walhalla, 1902, *L. R. Waldron;* Hillsboro, 1891, *A. B. Lee* 396; Minot, 1902, *Lunell.*

COLORADO: Canyon City, 1872, *Brandegee* 440; New Windsor, 1897, *Osterhout;* New Windsor, 1904, *Osterhout* 2924.

MINNESOTA: Battle Lake, *E. P. Sheldon;* Hennepin County, 1890, *Sandberg;* Minneapolis, 1892, *Sandberg;* Ulen, 1891, *E. P. Sheldon;* Cannon River, 1861, *T. J. Hale.*

WYOMING: Cheyenne, 1901, *A. Nelson* 8592.

ILLINOIS: Hyde Park, Chicago, 1899, *A. Chase* 1173.

IOWA: Armstrong, 1897, *Cratty & Pammel* 614; Harrison County, *Hitchcock* 14; Ames, 1892, *Geo. Carver.*

WISCONSIN: Lake Pepin, 1861, *T. J. Hale;* St. Croix, 1861, *Hale.*

MANITOBA: 1898, *E. S. Thompson.*

Allionia hirsuta rotundifolia Lunell[a] seems to be a form of this species. It appears to be a depauperate state, produced, probably, in the same way as *A. bushii.*

35. **Allionia chersophila** Standley, sp. nov.

Stems erect, tall, 1 meter high or even more at times, stout, simple below or sparingly branched, densely soft-pubescent throughout, not glandular above; leaves linear-lanceolate, rather thick, sessile, blunt-pointed, tapering to the base, more or less soft-puberulent on both surfaces, especially beneath; inflorescence ample, paniculate, branches opposite; involucres on pedicels 10 mm. long or less, 15 mm. broad, and 10 mm. high or less, the lobes broadly ovate, obtuse, sometimes mucronate, densely soft-pubescent; fruit 5 mm. long, narrow, acute, narrowed below, with 5 conspicuous ribs, these almost smooth, the spaces between them finely tuberculate, minutely hispidulous.

This is perhaps as closely related to *A. pilosa* as to any species, but is readily separated by its denser and softer short pubescence and stouter habit. Type in the herbarium of the University of Wyoming, cotype in that of Mr. K. K. Mackenzie; collected in barrens at Lees Summit, Jackson County, Missouri, September 9, 1901, *Mackenzie* 421; also collected in Jackson County, 1891, by Mr. B. F. Bush, who says that the plant is rare.

Other specimens examined:

MISSOURI: Barrens west of Lees Summit, 1899, *Mackenzie;* dry prairie along railroad north of Lees Summit, 1900, *Mackenzie;* barrens west of Lees Summit, 1899, *Mackenzie.*

KANSAS: "In rocky places," Miami County, 1882, *Oyster.*

36. **Allionia trichodonta** Standley, sp. nov.

Stems erect or ascending, sparingly branched, the branches alternate, slender, rather sparingly puberulent throughout or almost glabrous below; leaf blades linear or linear-lanceolate, 45 mm. long and 7 mm. wide or less, of medium thickness, attenuate to the apex and to the base, sessile, the margins wavy and ciliolate, with a few long, weak hairs on both surfaces; inflorescence narrowly cymose, its branches densely short-villous; involucres almost sessile or sometimes pediceled in the axils of the lower leaves, 11 mm. in diameter or less, densely short-villous, the pubescence having a silky appearance, especially on the margins of the lobes, these elliptical or lanceolate, acute or acutish; flowers not seen; fruit 4 mm. long, rather obtuse above, slightly narrowed below, with 5 very thick, smooth ribs, so thick that there are scarcely any spaces between them, minutely hispidulous.

Distinguished from *A. coahuilensis* and *A. pseudaggregata*, its nearest allies, by its narrower leaves and bracts and the thicker ribs of the fruit; from *A. coahuilensis* by its alternate branching, and from *A. pseudaggregata* by its more pubescent stems. Type in the herbarium of the University of California (no. 101379), collected at Ixmiquilpan, Hidalgo, Mexico, 1905, *Purpus.*

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[a] Bull. of the Leeds [N. Dak.] Herb. no. 2, 6. 1908.

37. **Allionia carletoni** Standley, sp. nov.

Plant about 1 meter high; stems simple below or more or less branched, stout, whitish, soft-pubescent throughout; leaf blades lanceolate, very thick, acutish, somewhat wavy-margined, conspicuously veined, rounded or cuneate at the base, 7 cm. long and 3 cm. wide or less, puberulent on both surfaces, almost or quite sessile; inflorescence paniculate, the branches mostly opposite, stout, open; involucres about 15 mm. in diameter, the lobes rounded or obtuse and short, with rather copious soft pubescence, ciliolate; involucres on pedicels about 10 mm. long, the pedicels subtended by very small and inconspicuous bracts; fruit 5 mm. long, acutish above, narrowed below, with 5 prominent smooth ribs, the spaces between the ribs each with a single vertical row of tubercles; fruit glabrous.

Easily distinguished by the glabrous fruit and the fine, short pubescence of the stems. Type U. S. National Herbarium no. 22755, collected in Barber County, Kansas, June 21, 1891, *Carleton* 256; also collected in Oklahoma, Neutral Strip, 1891, *Carleton* 361.

The specific name was adopted from Doctor Heimerl in herbarium under Mirabilis.

38. **Allionia exaltata** Standley, sp. nov.

Plant about 1.5 meters high from a rather thick, woody root; stem little branched below, glabrous throughout, glaucous, stout below, but slender above; leaf blades rather narrowly lanceolate, 70 mm. long and 18 mm. wide or less, acutish, attenuate at the base to a very short, thick petiole, or sessile, more or less wavy-margined, glabrous; inflorescence very openly paniculate, its branches slender and opposite; involucres on pedicels mostly about 10 mm. long, mostly glabrous or with a very few minute hairs; involucres 15 mm. in diameter, their lobes broadly ovate and rounded, glabrous or with a few minute hairs when young; fruit obtuse or acutish above, narrowed below, rugulose between the ribs, prominently 5-angled, glabrous.

This is a more slender plant than *A. carletoni*, and is probably ordinarily taller. It is readily separated from that species by its glabrous stem and leaves, the latter also being narrower. Type U. S. National Herbarium no. 22699, collected in the Cimarron Valley, Cherokee Outlet, Oklahoma, June, 1891, *Carleton* 223; also collected on the Cimarron River, Oklahoma, 1899, *Mark White* 163.

39. **Allionia sessilifolia** Osterhout, Bull. Torr. Club **32**: 611. 1905.

Specimens examined:

COLORADO: Canyon of Thompson River, Larimer County, 1905, *Osterhout* 3079.

40. **Allionia lanceolata** Rydb. Bull. Torr. Club **29**: 691. 1902.

Specimens examined:

COLORADO: Moraine Park, 1897, *Osterhout;* between Sunshine and Ward, 1902, *Tweedy* 5211; Fort Collins, 1897, *Crandall*, 2125.

WYOMING: Plumbago Canyon, 1899, *C. Schuchert.*

MISSOURI: Dodson, 1900, *Mackenzie;* St. Louis County, *Bush* 2090.

The following forms connect the species with the variety described below:

ARKANSAS: Hot Springs, *F. L. Harvey* 66.

OKLAHOMA: Lincoln County, 1895, *Blankinship;* Vinita, 1894, *Bush* 473.

40a. **Allionia lanceolata uniflora** (Heimerl) Standley.

Mirabilis albida uniflora Heimerl, Ann. Cons. et Jard. Genev. **5**: 182. 1901.

From the species this differs in its stouter habit, thicker and more erect leaves, 1-fruited involucres (there are sometimes 3 flowers in the involucre, but only one matures), and the form of the fruit. The fruit of the species is merely faintly angled, acutish above, minutely hispidulous, and not very prominently tuberculate, while that of subspecies *uniflora* is larger, with 5 prominent and thick ribs, strongly transversely ridged or tuberculate between the ribs, and more densely and more prominently hispidulous as well as more obtuse above.

Specimens examined:

KANSAS: Belvidere, 1897, *Ward*, type collection.

OKLAHOMA: Limestone Gap, 1877, *Butler* 2; Osage Nation, 1895, *Kimmons;* Indian Territory, 1891, *C. S. Sheldon* 226.

TEXAS: Terrell, 1904, *F. J. Tyler;* Corpus Christi Bay, 1894, *Heller* 1545; Baird, 1882, *Letterman* 129; Industry, 1894, *H. Wurzlow* 27; 1844, *Lindheimer* 293; Dallas, 1877, *Reverchon* 787; Houston, 1842, *Lindheimer;* Texas, *Buckley;* Gillespie County, *Jermy.*

41. **Allionia albida** Walt. Fl. Car. 84. 1788.

Calymenia albida Nutt. Gen. N. A. Pl. 26, 1818.

Oxybaphus albidus Sweet, Hort. Brit. **2**: 429. 1825.

Mirabilis albida Heimerl, Ann. Cons. et Jard. Genev. **5**: 182. 1901.

The only specimens that I have seen of this species were from South Carolina and the adjoining States.

42. **Allionia pseudaggregata** (Heimerl) Standley.

Mirabilis pseudaggregata Heimerl, Ann. Cons. et Jard. Genev. **5**: 183. 1901.

Specimens examined:

MEXICO: Near Chihuahua, 1886, *Pringle* 793, type collection.

TEXAS: Chenate Mountains, 1889, *Nealley* 528; near J. Davis's Ranch, 1883, *Havard* 66.

42a. **Allionia pseudaggregata subhirsuta** (Heimerl) Standley.

Mirabilis pseudaggregata subhirsuta Heimerl, Ann. Cons. et Jard. Genev. **5**: 184. 1901.

This differs from the type collection in having the stems and leaves more hirsute throughout. If the plant which I have placed here is the same as that upon which the variety was founded it is probably a good species.

Specimens examined:

MEXICO: Durango, 1896, *Palmer* 267.

The disposition of the following names is still unsettled:

OXYBAPHUS LINEARIFOLIUS S. Wats. Proc. Amer. Acad. **17**: 375. 1882.

I have not been able to examine any authoritative material of this species. It may be *A. divaricata* or perhaps some plant more closely related to *A. linearis.*

OXYBAPHUS ANGUSTIFOLIUS VISCIDUS Eastw. Proc. Cal. Acad. Sci. II. **6**: 313. 1896.

Allionia viscida Cockerell Proc. Acad. Phila. **1904**: 108. 1904.

I have seen no reliable material of this species; it may be *A. divaricata.*

6. ALLIONIELLA Rydb.

Allioniella Rydb. Bull. Torr. Club **29**: 687. 1902.

Low, much branched herbs with ascending or procumbent branches; leaves opposite, entire, petioled, viscid; flowers loosely panicled, 3 in each involucre;

involucres rotate and somewhat enlarged when mature, 5-lobed; perianth short funnelform, almost campanulate, with 3 distinct stamens; fruit ellipsoidal, smooth or very obscurely tubercled, glabrous.

1. **Allioniella oxybaphoides** (A. Gray) Rydb. Bull. Torr. Club **29**: 687. 1902.
Quamoclidion oxybaphoides A. Gray, Am. Journ. Sci. II. **15**: 320. 1853.
Mirabilis oxybaphoides A. Gray, Bot. Mex. Bound. 173. 1859.
Oxybaphus wrightii Hemsl. Biol. Centr. Am. **3**: 3. 1882.
Allionia oxybaphoides Kuntze, Rev. Gen. Pl. 533. 1891.
Type locality, east of El Paso (Texas).

Specimens examined:

NEW MEXICO: Organ Mountains, 1897, *Wooton* 587; Bear Mountain, near Silver City, 1903, *Metcalfe* 696; Gray, 1898, *Skehan* 103; Kingston, 1904, *Metcalfe* 1459; 10 miles west of Santa Fe, 1897, *Heller;* Santa Fe, 1881, *Engelmann;* Santa Fe Creek Valley, 1847, *Fendler* 746.

ARIZONA: Mesa west of Buckskin Mountains, 1894, *Jones* 6060; near Partridge Spring, 1901, *Leiberg* 5904.

COLORADO: Trail Glen, 1901, *F. Clements* 60; Manitou Springs, 1881, *Engelmann;* Grape Creek Valley near Canyon City, 1881, *Engelmann;* Williams Canyon, 1875, *Patterson;* Webster Canyon, 1872, *Redfield* 554; Canyon City, 1873, *Greene.*

UTAH: Dirty Devil River below Rabbit Valley, 1875, *Ward* 417.

1a. **Allioniella oxybaphoides glabrata** (Heimerl) Standley.
Mirabilis oxybaphoides glabrata Heimerl, Ann. Cons. et Jard. Genev. **5**: 180. 1901.

From the type this variety differs slightly, perhaps even too slightly to warrant its separation as a variety, in having the stem glabrous below and only slightly puberulent above. The following collections may perhaps be placed here:

NEW MEXICO: Capitan Mountains, 1900, *Earle* 399, type collection; Gallinas Mountains, 1904, *Wooton* 2823.

COLORADO: Buena Vista, 1897, *Crandall* 2119.

TEXAS: Gaudme, 1881, *Havard.*

ARIZONA: Northeastern Arizona, 1896, *Hough* 91.

7. QUAMOCLIDION Choisy.

Quamoclidion Choisy in DC. Prod. **13**^{2}: 429. 1849.

Perennial herbs, erect, branched, glabrous or pubescent; leaves opposite, entire, thick, petioled or sessile; flowers mostly large, several together surrounded by a gamophyllous, calyx-like involucre; perianth showy, corolla-like, with a tube of medium length, which is expanded into a wide or rather narrow, erect, or spreading limb; stamens 5, exserted; fruit hard, smooth, ellipsoidal to almost spherical, glabrous.

The genus was founded by Choisy upon two species: The first, which is to be taken as the type, he called *Q. nyctagineum*, of which *Mirabilis triflora* Benth. was said to be a synonym; the second species was called *Q. angulatum*, and was referred doubtfully to the genus. Doctor Rydberg, in his treatment of the Rocky Mountain Allioniaceae, placed *Oxybaphus laevis* Benth. in the genus, a plant which differs so widely from the type species in several respects that it has been placed in a new genus in this work.

KEY TO THE SPECIES.

Perianth 25 mm. long or less, with a very narrow limb_____ 1. *Q. triflorum.*
Perianth much larger, with a broad limb.
  Fruit rather strongly 5-angled, more or less tuberculate, usually abruptly narrowed at the base_____ 2. *Q. greenei.*
  Fruit not angled, smooth, not abruptly narrowed at the base.
    Fruit dark brown to black; stems mostly glabrous below _____ 3. *Q. multiflorum.*
    Fruit light brown, marked by 10 dark, vertical lines; stems usually pubescent throughout_____ 4. *Q. froebelii.*

1. **Quamoclidion triflorum** (Benth.) Standley.
Mirabilis triflora Benth. Pl. Hartweg. 23. 1839.
Quamoclidion nyctagineum Choisy in DC. Prod. **13**^{2}: 429. 1849.
Type locality, Mexico.

Specimens examined:

LOWER CALIFORNIA: Triumfo,, 1890, *Brandegee* 479; Pescadero, 1902, *Brandegee;* Todos Santos, 1890, *Brandegee.*

2. **Quamoclidion greenei** (S. Wats.) Standley.
Mirabilis greenei S. Wats. Proc. Am. Acad. **12**: 253. 1876.
Type locality, "On mountain sides about Yreka, California."

Specimens examined:

CALIFORNIA: Hornbrook, 1889, *Howell* 1386; near the Klamath River, 1889, *Howell.*

3. **Quamoclidion multiflorum** Torr.; A. Gray, Am. Journ. Sci. II. **15**: 321. 1853.
Oxybaphus multiflorus Torr. Ann. Lyc. N. Y. **2**: 237. 1828.
Nyctaginia ? torreyana Choisy in DC. Prod. **13**^{2}: 430. 1849.
Mirabilis multiflora A. Gray, Bot. Mex. Bound. 173. 1859.
Type locality, "About the forks of the Platte."

The plant was described by Choisy under Nyctaginia, because he was led to believe from Torrey's description that it had separate bracts.

Specimens examined:

COLORADO: Canyon City, 1872, *Brandegee* 439; Pueblo, 1873, *Greene;* La Veta, 1897, *Crandall;* Canyon City, 1890, *Bodin;* Arkansas Canyon, 1872, *Redfield* 552; Rio de Las Animas, 1846, *Fendler* 740; Huerfano, 1867, *Parry* 181; Canyon City, 1881, *Engelmann.*

ARIZONA: Grand Canyon, *Millspaugh* 94; Flagstaff, 1908, *MacDougal* 289; Galluno Mountains, 1894, *Toumey;* near Grand Canyon, 1901, *Purpus* 8183; Holbrook, 1896, *Myrtle Zuck* 9; Fort Whipple, 1864, *Coues;* Camp Verde, 1891, *Toumey;* Copper Basin, 1892, *Toumey* 178; Oracle, 1905, *Thornber;* Cochise, 1900, *Griffiths.*

TEXAS: Hueco Tanks, 1895, *Mulford* 104; Pena, 1889, *Nealley* 488; Texas, 1881, *Havard.*

NEW MEXICO: Patterson, 1900, *Wooton;* near Silver City, 1880, *Rusby;* banks of the Rio Grande 19 miles west of Santa Fe, 1897, *Heller* 3627; Aztec, 1895, *H. H. Griffin;* Gray, 1898, *Skehan* 38; Las Cruces, 1897, *Wooton* 80; Mesilla Valley, 1890, *Wooton;* Las Vegas, 1899, *Cockerell;* Santa Fe, 1898, *Cockerell;* Little Creek, White Mountains, 1899, *Turner* 107; Animas Creek, 1904, *Metcalfe* 1138; Cross L Ranch, Cimarron Canyon, 1903, *Griffiths* 5540; Santa Rita, 1895, *Mulford* 68; Dona Ana, 1846, *Wizlizenus* 85; Ocate Creek, Santa Fe Road, 1846,

Wislizenus 501; Coppermines and El Paso, *Wright* 1703; 1853–54, *Bigelow;* 1869, *Palmer;* McCarthy Station, 1889, *Munson & Hopkins;* Glorieta, 1881, *Vasey.*

3a. **Quamoclidion multiflorum glandulosum** Standley, subsp. nov.

Stems stout, rather abundantly glandular-puberulent throughout; leaf blades ovate, thick, acutish, rounded or subcordate at the base; petioles about one-third as long as the blades, glandular-puberulent; peduncles stout, densely glandular-puberulent, 2 cm. long or less; bracts about 2 cm. long, the free portion a little longer than the tube, obtuse or acutish, densely glandular-puberulent; flowers 4 cm. long or less; leaves a rather light yellowish-green.

This subspecies is distinguished by its yellowish-green, puberulent leaves, glandular stem, and puberulent, obtuse bracts. Type in the National Herbarium, cotype in the Missouri Botanical Garden, collected in Colorado on a dry mesa at Grand Junction, May 28, 1894, *Crandall* 423, altitude 1375 meters. There is no mature fruit on either of these specimens, but a plant in the Rocky Mountain Herbarium that seems to be the same, collected at Deer Run, Colorado, 1901, *C. F. Baker* 81, has fruit elliptical or oblong-elliptical in outline, about 9 mm. long, dark reddish brown in color, obscurely 10-nerved, glabrous. This last plant has rather thin and almost scarious reddish bracts.

Other specimens examined:

COLORADO: Mancos, 1890, *Eastwood;* Grand Junction, 1894, *Jones* 5476.

Baker's 304 from Rosa, New Mexico, is probably the same, although it does not match the type in all particulars.

3b. **Quamoclidion multiflorum obtusum** Standley, subsp. nov.

Stems rather slender, with short, rather viscid pubescence throughout which consists of flattened, white hairs; leaf blades very broadly ovate or almost reniform, thin, bright green, almost glabrous, broadly obtuse and apiculate at the apex, semicordate to rounded at the base, the blades somewhat decurrent upon the petiole which is half as long as the blade or shorter; bracts broadly ovate, acutish, apiculate, about 3 cm. long and 15 mm. wide, the free portion one-half as long as the tube or longer, bright green; flowers like those of the species.

Distinguished by the large and broad bracts and especially by the shape of the leaves. Type in the herbarium of the University of Wyoming, collected on rocky ledges at Kernan, Nevada, 1902, *Goodding* 653. The plant is covered with what appears to be the web of some insect, giving it a peculiar woolly appearance.

The following plants should probably be placed here, although they have thicker leaves and the leaves are not acuminate. They have dark-colored fruits, showing that they are more closely related to *Q. multiflorum* than to *Q. froebelii.* They with the subspecies *glabratum* of the latter species form a close transition between the two species.

ARIZONA: Peach Springs, 1893, *Norman C. Wilson;* Hackberry, 1884, *Jones* 4687; ? Fort Apache, 1901, *Mayerhoff* 80; ? Beaverdam, 1891, *Vernon Bailey* 1937.

UTAH: ? La Verken, 1894, *Jones* 5196t; Cedar City, 1894, *Jones* 5197; Santa Clara Valley, 1894, *Jones* 5139t.

4. **Quamoclidion froebelii** (Behr) Standley.

Oxybaphus froebelii Behr, Proc. Cal. Acad. Sci. **1**: 69. 1855.

Mirabilis multiflora pubescens S. Wats. in Brewer & Wats. Bot. Cal. **2**: 2. 1880.

Mirabilis froebelii Greene, Bull. Cal. Acad. **1**: 124. 1885.

Mirabilis multiflora frœbelii Jones, Contr. Western Bot. **10**: 49. 1902.

Type locality. "Culta e seminibus a J. Froebel prope Warner's Ranch lectis."

Specimens examined:

CALIFORNIA: Warner's Ranch, 1894, *R. D. Alderson;* Argus Mountains, 1897, *Purpus* 5418; Manzana, Antelope Valley, 1905, *Hall* 6259; Owen's Valley and Fort Tejon, 1862–64, *G. H. Horn;* Bakersfield, 1896, *Dury* 1889; Walkers, 1885, *Cleveland;* Coast Range, 1882, *Parish* 658; California, 1880, *Vasey* 516; Santa Ysabel, 1893, *H. W. Henshaw;* between Cuyamaca and Oriflamme Canyon, 1903, *Abrams* 3925; Providence Mountains, 1861, *Cooper;* Mill Creek Canyon, Panamint Mountains, 1891, *Coville & Funston* 761; Fort Tejon, 1857–8, *Xantus* 103.

4a. **Quamoclidion froebelii glabratum** Standley, subsp. nov.

Stems glabrous or almost so throughout, the younger branches sometimes sparingly puberulent; leaf blades broadly ovate or subreniform, 8 cm. long and as broad or less, broadly rounded at the apex or obtuse, cordate or semicordate at the base, the blades slightly decurrent on the petioles, these one-third as long as the blades or less; pedunceles about 3 cm. long, stout; bracts 3 cm. long, acutish or obtuse, sometimes mucronate, broad, glabrous; flowers about 5 cm. long; fruit broadly elliptical or oval in outline, about 8 mm. long and 6 mm. wide, light reddish brown marked by 10 black, vertical lines.

The subspecies is separated from the species by its different pubescence and more obtuse leaves. Type in the herbarium of the University of California, collected in the Providence Mountains, California, May 25, 1902, *Brandegee*.

Other specimens examined:

CALIFORNIA: San Felipe, 1894, *Brandegee;* Vandeventer Flat, San Jacinto Mountains, 1901, *Hall* 2162.

NEVADA: Pahroc Range, 1898, *Purpus* 6300.

8. HESPERONIA Standley.

Hesperonia Standley, gen. nov.

Mirabilis of various authors, in part, not L.

Quamoclidion Rydb. Bull. Torr. Club **29**: 686, in part; not Choisy.

Perennial herbs; leaves opposite, thick, entire, petioled or sessile; inflorescence axillary or terminal; involucres campanulate, composed of 5 bracts which are united by their bases for about half their length, not enlarged in fruit; flowers 1 in each involucre; perianth campanulate, white or purplish red; stamens usually 5, distinct; fruit ellipsoidal or spherical, not angled or ribbed, smooth or sometimes very faintly tuberculate, glabrous.

The plants of this proposed genus have been variously placed in Mirabilis, Quamoclidion, and Oxybaphus, to all of which the genus is closely related. But besides differing considerably from all those genera in general appearance, Hesperonia is separated from Allionia and Mirabilis by the form of the fruit, differs decidedly from Mirabilis and Quamoclidion in the shape of the perianth, and is separated at once from Quamoclidion by the number of flowers in the involucre.

Type species, *Mirabilis californica* A. Gray.

KEY TO THE SPECIES.

Fruit spherical, not noticeably longer than thick.

Fruit dark brown, not conspicuously vertically lined; leaves thick and rather fleshy; stems and leaves scabrate; branches comparatively slender ..... 1. *H. cedrosensis.*

Fruit dull olive with 10 conspicuous, paler, transverse lines.
Stems rough-pubescent, more or less viscid, not villous---------- 2. *H. aspera.*
Stems villous, not viscid---------- 2a. *H. aspera villosa.*

Fruit not spherical, conspicuously longer than thick.
Plants very large and stout; leaves 5 cm. long or less; blades short-petioled or almost sessile; stems stout, rough and glandular-pubescent; lobes of the involucre narrowly lanceolate---------- 3. *H. tenuiloba.*

Plants much smaller and stems much more slender; leaves not more than half the size of the above.
Plants perfectly glabrous throughout, or some of the young leaves, perhaps, with a few scattering hairs; leaves thin, ovate, acute; stems slender, the branches not spreading---------- 4. *H. laevis.*

Plants not glabrous throughout, the pubescence sometimes scant but some always present on the stems.
Stems villous, slender, with long internodes; leaves rounded or obtuse at the apex---------- 8b. *H. glutinosa gracilis.*

Stems not villous.
Leaves very small, mostly about 1 cm. long; stems slender and much branched, woody at the base---------- 7a. *H. californica microphylla.*

Leaves larger; stems less branched and with longer internodes.
Flowers purplish red.
Fruit almost 8 mm. long, narrow; leaves thin, obtuse, cordate or rounded at the base; stems woody below; flowers few, conspicuously pediceled; lobes of the involucre lanceolate, 7 mm. long---------- 5. *H. oligantha.*

Fruit about 4 mm. long.
Flowers about 12 mm. long; fruit narrowed toward the base and apex, inconspicuously striate, dark brown---------- 7. *H. californica.*

Flowers about 2 cm. long; fruit dark brown, not at all striate; stems finely pubescent especially above---------- 6. *H. polyphylla.*

Flowers mostly white.
Fruit mostly narrowed at both ends, leaves reniform or broadly ovate; stems and leaves with abundant, glutinous, rather long pubescence ..... 8. *H. glutinosa.*
Fruit not narrowed at the ends, but rounded, brown or dull green; stems sparingly pubescent, the leaves almost glabrous ..... 8a. *H. glutinosa retrorsa.*

1. Hesperonia cedrosensis Standley, sp. nov.

Stems stout, apparently dichotomously branching, more or less scorpioid, covered with a pubescence consisting of scattered, flattened, whitish hairs; internodes shorter than in *H. laevis;* leaf blades narrowly triangular or subhastate, 30 mm. or less in length and 18 mm. wide or less, more or less wavy-margined, acute at the apex, mostly truncate to subcordate at the base, thick, with a few scattered, flattened hairs on both surfaces; petioles very short, some of the uppermost blades almost sessile; flowers sessile or on very short peduncles, sometimes subtended by bract-like leaves, solitary or sometimes clustered; bracts 7 mm. long or less, the free portion shorter than the tube, rather narrowly triangular, acute, densely scabrous; flowers about 12 mm. long; stamens included; fruit subspherical, rather larger than that of *H. californica*, dark brown in color marked by 10 lighter vertical lines.

Type in the herbarium of the University of California; collected on Cedros Island, California, April 3, 1897, *Brandegee.* The same is in the National Herbarium, collected at the same locality in 1889 by Palmer. A plant distinguished by its subglobose fruit and scabrous pubescence.

Here belong, probably, the following collections:

CALIFORNIA: San Clemente Island, 1903, *Mrs. Blanche Trask* 193; same locality, 1902, *Mrs. Blanche Trask* 14; same locality, 1894, *Brandegee.*

2. Hesperonia aspera (Greene) Standley.

Mirabilis aspera Greene, Erythea **4**: 67. 1896.

Stems stout, dichotomously branched, roughly retrorse-pubescent, leaf blades ovate, subcordate, thick, rough-puberulent, 25 mm. long and 18 mm. wide or less, obtuse or the uppermost ones subacute; petioles very short, some of the blades almost sessile; inflorescence dichotomously branched, dense; flowers on stout peduncles about 5 mm. long; bracts thick, narrowly to broadly ovate, 6 to 7 mm. long, the free portion about as long as the tube, the involucre about 6 mm. in diameter when distended by the fruit; flowers about 1 cm. long; fruit globose or subglobose, about 5 mm. in diameter, dull olive-green marked by 10 lighter vertical lines.

This species is distinguished by its thick, obtuse, almost sessile, rather narrow leaves, stout stems, rough pubescence, spherical or subspherical fruit of peculiar color, and its thick bracts.

Specimens examined:

CALIFORNIA: Mohave Desert, 1895, *Parish* 3757, type; Mohave Desert, 1886, *Parish* 2078; Mohave Desert, 1892, *Parish;* Pipe Canyon, San Bernardino Mountains, 1894, *Parish* 3183.

2a. Hesperonia aspera villosa Standley. subsp. nov.

Different from the type in having the stems clad with an abundant soft villous instead of a harsh and glutinous pubescence, the leaves more or less villous and obtuse or broadly rounded at the apex, and the flowers large, with exserted stamens.

Specimens examined:

CALIFORNIA: Mohave Desert, 1901, *Parish* 4940, type; Providence Mountains, 1902, *Brandegee;* Argus Mountains, 1891, *Coville & Funston* 741.

3. Hesperonia tenuiloba (S. Wats.) Standley.

Mirabilis tenuiloba S. Wats. Proc. Am. Acad. **17**: 375. 1882.

Readily recognized by its robust habit, large leaves and stems, and narrow bracts.

Specimens examined:

CALIFORNIA: Coyoté Wells, Colorado Desert, 1905, *Brandegee;* Palm Creek, 1895, *Brandegee;* Mountain Spring, San Diego County, 1894, *L. Schoenfeldt* 3070; same locality, 1894, *Mearns* 3017.

LOWER CALIFORNIA: Signal Mountain, Colorado Desert, 1901, *Brandegee.*

In the national herbarium there are two sheets of a Hesperonia labeled *Mirabilis tenuiloba*, collected in the Colorado Desert, 1889, by W. G. Wright. This is the type locality and the collector is the same as the collector of the type. I am not certain, however, that these belong to the type collection. The plant is hardly separable from *H. californica* except that it has narrower bracts. If this is *H. tenuiloba*, and it answers to the brief original description about as well as the plants I have listed under that name, the others should have a new name, for they are certainly not the same as these plants of Mr. Wright's.

4. Hesperonia laevis (Benth.) Standley.

Oxybaphus laevis Benth. Bot. Voy. Sulph. 44. 1844.

Mirabilis laevis Curran, Proc. Cal. Acad. Sci. II. **1**: 235. 1889.

In the herbarium of the University of California there is a specimen of what I take to be this species, collected at the type locality, Magdalena Bay, Lower California, by Doctor Lung, U. S. N., no. 28. The plant has no fruit, but otherwise the characters can be determined fairly well, although the specimen is not of the best.

Branches dichotomous, straight, perfectly glabrous, rather slender, with long internodes; leaf blades ovate, somewhat sinuate-margined, rather thin, acutish: leaves 30 mm. long and 20 mm. wide or less, the uppermost considerably smaller; petioles almost as long as the blades in the lowest leaves, the uppermost blades almost sessile; leaves glabrous; flowers single in the axils of the leaves or apparently clustered at times at the ends of the branches; bracts mostly 10 mm. long, the free portion as long as the tube or longer, the segments lanceolate, acute, glabrous, or with a very few minute, appressed hairs; flowers about 16 mm. long.

The type was described as glabrous, and it seems quite probable that this is the same plant as the one collected at the same place during the voyage of the Sulphur. It is the only quite glabrous plant that I have seen in the genus.

5. Hesperonia oligantha Standley, sp. nov.

Stems branching from a woody base, the lower branches suffrutescent; stems slender, very closely and sparingly puberulent or almost glabrous; internodes 25 to 50 mm. long; leaf blades ovate, subcordate at the base or rounded or rarely somewhat narrowed, thin, sparingly puberulent, with prominent lateral veins, the lower leaves obtuse, the upper ones acute; petioles one-third as long

as the blades; flowers on peduncles almost as long as the involucre; bracts lanceolate, acute, the free portion as long as the tube, finely and densely puberulent, the whole about 9 mm. long; flowers about 12 mm. long, the stamens long-exserted; fruit cylindrical; acutish at both ends, dark brown, smooth, 7 or 8 mm. long, and almost 3 mm. thick.

From *H. polyphylla* this differs in its obtuse lower leaves, which are sometimes cordate at the base, thinner blades, less pubescent stem, longer and narrower fruit, and fewer flowers; from *H. tenuiloba*, in its more slender stems, obtuse lower leaves, thinner blades, and longer and narrower fruit. Type in the herbarium of the University of California, collected at Calmalli, Lower California, 1898, *Purpus* 82.

6. Hesperonia polyphylla Standley, sp. nov.

Perennial; much branched from a woody base, the lower branches suffrutescent; stems stout, glabrous below, finely short-pubescent above, not viscid, the nodes swollen and conspicuous, the internodes short; leaf blades ovate, acute, rounded at the base, glabrous or the younger ones sparingly puberulent, thick and fleshy, the lateral veins inconspicuous; blades small, less than 20 mm. long and about 10 mm. wide; petioles not more than one-third as long as the blades, stout; most of the flowers on peduncles which are about as long as the involucre; bracts lanceolate or ovate-lanceolate, the free portion about as long as the tube, the whole about 9 mm. long, thick and puberulent; flowers about 2 cm. long and almost as wide; the stamens included; fruit oblong in outline, broadly obtuse at both ends, smooth, brown, about 4 mm. long and almost 3 mm. wide.

From *H. tenuiloba* this differs in the smaller size of the plant, shorter internodes, more leafy appearance of the plant, smaller and thicker leaves which are not cordate at the base, and the broader segments of the involucre. The internodes near the ends of the branches are very short, so that the branches are densely leafy; there is a flower in almost every axil and at least one at each node, so that the flowers appear numerous. Type in the herbarium of the University of California, collected at San Borga, Lower California, May 6, 1889, *Brandegee*. On the same sheet is what appears to be the same plant, collected at Los Angeles Bay, Gulf of California, 1887, *Palmer* 600.

7. Hesperonia californica (A. Gray) Standley.

Oxybaphus glabrifolius crassifolius Choisy in DC. Prod. **13**[2]: 431. 1849.
Oxybaphus glabrifolius Torr. Pac. R. Rep. **4**: 131. 1857, not Vahl.
Mirabilis californica A. Gray, Bot. Mex. Bound. 173. 1859.
Oxybaphus californicus Benth. & Hook. Gen. Pl. **3**: 4. 1880.
Quamoclidion laeve Rydb. Bull. Torr. Club **29**: 687. 1902.

Specimens examined, in part:

CALIFORNIA: Vicinity of San Bernardino, 1896, *Parish* 4159; Pasadena, 1882, *Jones* 3020; Riverside, 1903, *Hall* 3807; Griffith Park, 1903, *Braunton* 795; southwestern California, 1901, *Grant* 3721; Matilija Canyon, 1866, *Peckham;* Santa Barbara, 1861, *Brewer* 364; Riverside, 1889, *W. S. Boyd;* Mexican Boundary Survey 1111; mountains east of San Diego, 1850, *Parry;* Santa Ysabel, 1893, *Henshaw;* Santa Catalina Island, 1895, *Trask;* Santa Lucia Mountains, 1898, *Plaskett;* near Mentone, 1898, *Leiberg* 3289; San Diego, 1896, *Brandegee;* Cottonwood Creek, San Diego County, 1905, *Brandegee;* Santa Monica Experiment Station, 1897, *J. H. Barber* 49; San Diego, 1891, *S. W. Dunn;* San Luis Obispo County, *R. W. Summers;* Claremont, 1897, *H. P. Chandler;* San Diego, 1904, *N. K. Berg;* Playa del Rey, 1902, *Abrams* 2504; foothills of the San Bernardino Mountains, 1885, *Parish* 659; Del Mar, 1895, *Belle S. Angier* 117; Wilmington, 1882, *Pringle.*

The following plants differ from the typical form in being almost glabrous:

CALIFORNIA: San Diego, 1902, *Brandegee* 826; Santa Inez Mountains, 1888, *Brandegee;* Santa Barbara, 1902, *Elmer* 3764; Elysian Hills, Los Angeles County, 1902, *Braunton* 162; Los Angeles, 1904, *Grant* 791.

A plant in the herbarium of Nevada State University collected at Highlands, San Bernardino County, California, 1904, by N. K. Berg, is an interesting form with long-petioled leaves which are rounded and cordate at the base and sometimes reniform in outline, and with stout, suffrutescent stem.

7a. Hesperonia californica microphylla Standley, subsp. nov.

Much branched from a woody base, the lower branches woody and whitish, glabrous, the internodes short, the nodes large and swollen; leaf blades irregularly ovate or deltoid-ovate, obtuse or acutish, mostly semicordate at the base, thick, 15 mm. long and 8 mm. wide or usually less; petioles about half as long as the blades; branches of the inflorescence slender, not much branched, 2 or sometimes more flowers at each node, the flowers on short pedicels which are sparingly scabrate; flowers about 11 mm. long; stamens included; bracts 4 or 5 mm. long, the free portion rather narrowly triangular, acute, a little longer than the tube or as long; fruit elliptical in outline, 4 mm. or less in length, dark brown.

Type in the herbarium of the University of California (no. 101214), collected by Brandegee on San Martin Island, Lower California, March 12, 1897. Also collected by the same collector at Ensenada, Lower California, April 26, 1893. The small leaves and flowers, whitish stems, and dense habit distinguish the subspecies.

8. Hesperonia glutinosa (A. Nelson) Standley.

Mirabilis glutinosa A. Nelson, Proc. Biol. Soc. Wash. **17**: 92. 1904.

Specimens examined:

NEVADA: Karshaw, Meadow Valley Wash, 1902, *Goodding* 967, type; Humboldt County, 1865, *Torrey;* Virginia Mountains, 1867, *Watson* 963.

8a. Hesperonia glutinosa retrorsa (Heller) Standley.

Mirabilis retrorsa Heller, Muhlenbergia **2**: 193. 1906.

I can not see how this can be separated from *H. glutinosa* except as a subspecies. It differs from that species in having narrower and more acute leaves and less abundantly pubescent stem; but aside from these minor differences I can see little to separate the two plants.

Specimens examined:

CALIFORNIA: Near Southern Belle Mine, Mono County, 1906, *Heller* 8336, type; near Victorville, 1905, *Hall* 6206; Sierra Nevada Mountains, 1875, *Lemmon;* Colorado Desert, 1905, *Brandegee;* Antelope Valley, 1896, *Davy* 2294.

NEVADA: Reno, 1895, *F. G. Hillman;* Pah Ute Mountains, 1868, *Watson* 963; Pyramid Lake, 1903, *G. H. True* 758; Truckee Pass, Virginia Mountains, 1903, *Kennedy* 727; Truckee Pass, 1907, *Kennedy* 1595; Mica Spring, 1894, *Jones* 5045a.

The following are doubtfully referred here:

CALIFORNIA: San Felipe Canyon, Colorado Desert, 1901, *Brandegee;* east slope of Walker Pass, 1891, *Coville & Funston* 1018; Ralston Desert, 1891, *Coville & Funston* 1996.

8b. Hesperonia glutinosa gracilis Standley, subsp. nov.

Stems very slender, more or less villous throughout, especially above, not viscid or inconspicuously so, not much branched except near the base; inter-

nodes very long, 13 cm. or less; leaf blades irregularly ovate, 35 mm. long and 37 mm. wide or less, rather thin, obtuse or broadly rounded at the apex, semicordate or rounded at the base, more or less puberulent on both surfaces, except the oldest blades, which are sometimes quite glabrous; petioles about one-third as long as the blades, villous; inflorescence slender, few-flowered, the separate flowers almost sessile; bracts 5 or 6 mm. long, lanceolate or narrowly triangular, the free portion rather longer than the tube; perianth about 8 mm. long; fruits subelliptical, narrowed at both ends, brown marked with transverse darker marks.

Type U. S. National Herbarium (no. 212108), collected in Sabino Canyon, Arizona, 1892, *Toumey* 471c. The plant is distinguished by its villous pubescence and slender stems.

Other specimens examined:

ARIZONA: Tempe, 1896, *Toumey*, not as villous as the type; Arizona, 1876, *Palmer*, 644, not typical, but with the villous pubescence; Hardyville, 1868, *C. A. Almondinger.*

CALIFORNIA: Colton, 1881, *Vasey*, placed here because of its pubescence; San Felipe Creek below Bonner, 1900, *Brandegee.*

NEW MEXICO: No locality, 1881, *Vasey.*

The label states that the last-cited plant is from New Mexico, but it is probably incorrect. No specimen of any species of the genus has been found in New Mexico at any other time so far as the author is able to learn.

Here probably belongs *Mirabilis bigelovii* A. Gray. See page 369.

9. MIRABILIS L.

Mirabilis L. Sp. Pl. 1: 177. 1753.

Nyctago Juss. Gen. 90. 1789.

Perennial herbs, glabrous or pubescent, with large, thickened roots; leaves opposite, their blades entire, petioled or sessile; flowers solitary in a gamophyllous, 5-lobed, calyx-like involucre; perianth colored, corolla-like, showy, with a long slender tube and a broadly spreading limb; stamens mostly 5, unequal, with slender, filiform filaments which are united at the base; fruit leathery, obscurely 5-angled or 5-ribbed, narrowed to the base, smooth or somewhat tuberculate, glabrous or pubescent.

Type species, *Mirabilis jalapa* L.

A number of species have been described besides those mentioned here, most of them coming from Mexico, Central America, and northern South America.

KEY TO THE SPECIES.

Stamens long-exserted, twice as long as the perianth; perianth white, tinged with pink; lobes of the involucre obtuse ..... 1. *M. exserta.*

Stamens exserted, but considerably less than twice as long as the perianth; lobes of the involucre mostly acute.

Perianth 3 to 5 cm. long, red, yellow, or rarely white; tube funnelform ..... 2. *M. jalapa.*

Perianth 10 to 15 cm. long, white; tube long-tubular.

Stems densely glandular above; leaves glandular on both surfaces, the upper ones sessile ..... 3. *M. longiflora.*

Stems almost glabrous above, not glandular; leaves glabrous, all of them petioled, although the upper petioles may be very short; tube of the perianth more slender ..... 4. *M. wrightiana.*

1. **Mirabilis exserta** Brandeg. Proc. Cal. Acad. Sci. II. 3: 165. 1891.

Specimens examined:

LOWER CALIFORNIA: Sierra de San Francisquito, 1890, *Brandegee* 480, type; La Chuparosa, 1899, *Brandegee.*

2. **Mirabilis jalapa** L. Sp. Pl. 177. 1753.

Type locality, "In India utraque."

Stems glabrous, or slightly puberulent above; leaves ovate, rather narrowly so, rather acuminate, semicordate or truncate at the base, sometimes abruptly narrowed to the petiole, this very short in the upper leaves; bracts lanceolate, acute, ciliolate, more or less puberulent, the free portion about as long as the tube; flowers about 4 cm. long, the tube expanding gradually toward the limb, which is about 3 cm. wide; fruit about 10 mm. long and 5 or 6 mm. thick, ovoid, dark brown, 5-angled, glabrous, tuberculate between the angles; tubes of the perianths slightly pubescent; stamens exserted.

Specimens examined:

FLORIDA: Northeast of Key West, 1904, *Lansing* 2448; Jacksonville, 1899, *Curtiss* 6541.

MEXICO: Durango, 1896, *Palmer* 631; Saltillo, 1848, *Gregg* 231.

PARAGUAY: 1888–90, *Morong* 622.

COLOMBIA: Santa Marta, 1898–1901, *H. H. Smith* 1324.

CUBA: Cieneguito, 1895, *Combs* 286.

2a. **Mirabilis jalapa volcanica** Standley, subsp. nov.

Stems rather slender, strongly angled when dry, with rather soft pubescence throughout; leaf blades ovate or narrowly ovate, rather acuminate at the apex, subcordate or rounded at the base, with prominent pubescent veins, 35 to 70 mm. long and 25 to 45 mm. wide; petioles 1 cm. long or less; inflorescence subcymose, the flowers clustered; bracts lanceolate to narrowly triangular, the free portion about as long as the tube; flowers about 5 cm. long and 3 cm. broad, the tube slender, red; stamens not much exserted; fruit 8 mm. long and 4 or 5 mm. thick, narrowly ovoid, with 5 indistinct ridges, not angled, smooth between the ridges and not tuberculate or only faintly so, pubescent with short, fine, soft, whitish hairs; tube of the perianth almost or quite glabrous; young leaves not ciliolate, but the bracts sometimes sparingly so; bracts usually sparingly puberulent.

This differs from the species in its pubescent and smoother fruit and more pubescent stem. Type in herbarium of Field Museum of Natural History; cotypes at Missouri Botanical Garden and the University of California; collected at pedregal (lava beds), Valley of Mexico, altitude 2,240 meters, August 19, 1896, *Pringle* 6433. Also collected at Durango, 1896, *Palmer* 630, 631.

2b. **Mirabilis jalapa gracilis** Standley, subsp. nov.

Stems very slender, glabrous except for scattered, almost imperceptible cinereous pubescence on the youngest branches; leaf blades thin, narrowly ovate or broadly lanceolate, long-attenuate, narrowed toward the base into a slender petiole 10 to 35 mm. long; leaf blades 55 to 80 mm. long and 20 to 45 mm. wide; petioles glabrous; bracts linear-lanceolate, acute, free part about as long as the tube, the whole 15 mm. long or less; flowers 2 or 3 at the ends of the branches, conspicuously peduncled, their tubes slender and glabrous; fruit narrowly ovoid, acutish below, 8 mm. long and 4.5 mm. thick, 5-angled and strongly tuberculate, pubescent with abundant short, yellowish, soft hairs.

This differs from the species in its narrower, thinner leaves, which are attenuate at the base, longer petioles, more slender stems, and pubescent fruit; from subspecies *volcanica* in its different leaves, longer petioles, tuberculate fruit, and more slender stems. Type in the herbarium of the University of California; collected at Culiacan, Sinaloa, Mexico, September 17, 1904, *Brandegee.*

2c. **Mirabilis jalapa lindheimeri** Standley, subsp. nov.

Stems rather slender, glabrous; leaf blades broadly deltoid-ovate to ovate, thin, short-acuminate or acute, truncate, rounded, or narrowed at the base, the blades always slightly decurrent upon the glabrous, slender petioles, which are usually half as long as the blades or longer; involucres in clusters of about 3, or sometimes solitary, mostly pediceled; bracts lanceolate-ovate, minutely puberulent, not usually ciliolate, the free portion about as long as the tube; flowers about 5.5 cm. long; limb about 2.5 cm. wide, with prominent rounded lobes, the tube almost or quite glabrous; stamens about as long as the perianth; fruit about 10 mm. long and 5 mm. thick, ovoid, with 5 inconspicuous, broad ribs, not angled, smooth, not tuberculate, pubescent with fine, short, soft, yellowish, appressed hairs.

This can at once be distinguished by its broad leaves. Its pubescent fruit separates it from the species, and its longer petioles and glabrous stem from subspecies *volcanica.* Type in the herbarium of the Missouri Botanical Garden, collected at New Braunfels, Tex., June, 1846, *Lindheimer.*

Other specimens examined:

TEXAS: Comale Creek, *Lindheimer* 470; New Braunfels, 1851, *Lindheimer* 567; San Antonio, *E. H. Wilkinson* 134; San Antonio, 1900, *Bush* 1209; Canyon Blanco, Uvalde County, 1886, *Reverchon* 1586; Houston, 1877, *Ward.*

2d. **Mirabilis jalapa ciliata** Standley, subsp. nov.

Stems slender, abundantly furnished with fine, soft pubescence which is almost villous, the pubescence especially abundant on the young stems; leaf blades ovate, subacuminate, oblique at the base, about 11 cm. long and 6 cm. wide or less, thin, glabrous above, more or less puberulent below, all conspicuously ciliate along the margins, the hairs soft and tawny; petioles short, 25 mm. long or less; flowers sessile or short-pediceled; bracts 12 mm. long or less, ovate, short-acuminate, ciliolate; flowers about 55 mm. long, their tubes rather thick, the limb about 30 mm. broad; fruit (immature) in shape like that of *M. jalapa,* tuberculate, finely pubescent.

The most striking characteristic of the plant is found in the ciliate leaves and bracts. Type in the herbarium of the Missouri Botanical Garden, collected in the Oaxaca Valley, Oaxaca, Mexico, altitude 1,550 meters, October 1, 1894, *C. L. Smith* 791.

3. **Mirabilis longiflora** L. Vet. Akad. Handl. Stockh. 176. *pl. 6. f. 1.* 1755.

Specimens examined:

MEXICO: Cuernavaca, 1896, *Pringle* 6377; Gallejo Spring, Chihuahua, 1846, *Wislizenus* 122; Ixtaccihuatl, 1903, *Purpus* 49.

TEXAS: Chenate Mountains, *Havard;* Eagle Pass, 1881, *Havard;* Limpia Canyon, 1889, *Nealley* 618; 1849, *Wright* 595.

ARIZONA: Beaver Creek near Camp Verde, 1891, *MacDougal;* Prescott, 1896, *Kunze;* south of Tucson, 1892, *Toumey* 395; Fort Whipple, 1869, *Palmer.*

4. **Mirabilis wrightiana** A. Gray; Britton & Kearney, Trans. N. Y. Acad. Sci. **14**: 28. 1894.

Specimens examined:

NEW MEXICO: Kingston, 1904, *Metcalfe* 1187; Eagle Creek, White Mountains, 1899, *Turner* 80; Chiz, 1904, *Wooton* 2829; Gila Hot Springs, 1900, *Wooton;* Mogollon Mountains, 1881, *Rusby* 350; Middle Fork of the Gila, 1903, *Metcalfe* 432; Grant County, 1880, *Greene;* near Silver City, 1880, *Greene;* base of San Luis Mountains, 1893, *Mearns* 2155; Dog Spring, Dog Mountains, 1893, *Mearns* 2359; Animas Valley, 1893, *Mearns* 2499; Santa Rita, 1895, *Mulford* 717.

ARIZONA: Apache Pass, Chiracahua Mountains, 1881, *Lemmon;* Bowie, 1884, *Jones;* Fort Apache, 1901, *Mayerhoff* 44; Fort Lowell, 1903, *Thornber* 90; Santa Rita Mountains, 1880, *Engelmann;* Fort Huachuca, 1894, *Wilcox* 299, 408; Cottonwood, 1874, *Rothrock* 359; Camp Wallace, 1867, *Doctor Smart* 423; Fort Whipple, 1865, *Coues & Palmer* 15.

TEXAS: El Paso, *Wright* 1702.

MEXICO: Guadalupe Canyon, Sonora, 1893, *E. C. Merton* 2052; Canyon above Palomas, Saltillo, 1848, *Gregg* 331.

MIRABILIS BIGELOVII A. Gray, Proc. Am. Acad. **21**: 413. 1886. I have seen no reliable material of this species and can not determine it certainly without seeing the type. It is probably *Hesperonia glutinosa gracilis* or some other form of *H. glutinosa.*

10. ACLEISANTHES A. Gray.

Acleisanthes A. Gray, Am. Journ. Sci. II. **15**: 259. 1853.
Pentacrophys A. Gray, loc. cit.

Perennial herbs or shrubby plants; leaves opposite, rather thick, the blades unequal, petioled, entire; flowers axillary or terminal, each subtended by 1 to 3 small, narrow bracts; perianth white, corolla-like, with a long slender tube and spreading, 5-lobed limb; stamens 2 to 5, unequal, sometimes exserted, with very slender filaments, these united at the base; fruit rather narrowly ellipsoidal, 5-angled or 5-ribbed.

KEY TO THE SPECIES.

Ribs ending above in conspicuous knobs or glands.
- Leaves obtuse; glands at the summit of the ribs; bracts one-half as long as the fruit ..... 1. *A. wrightii.*
- Leaves acute; glands in depressions below the knobs at the tops of the ribs; bracts as long as the fruit or longer ..... 2. *A. acutifolia.*

Ribs not ending above in conspicuous knobs or glands.
- Opposite leaves strongly unequal ..... 3. *A. anisophylla.*
- Opposite leaves not strongly unequal.
  - Leaves acuminate, lanceolate; plants mostly glabrous ..... 4. *A. longiflora.*
  - Leaves not acuminate.
    - Leaves ovate, mucronate, thick and fleshy ..... 5. *A. crassifolia.*
    - Leaves reniform-cordate, obtuse or rather obtuse.
      - Leaves thin, rather large; flowers conspicuously pediceled ..... 6. *A. obtusa.*
      - Leaves thick and considerably smaller; flowers sessile ..... 7. *A. greggii.*

1. **Acleisanthes wrightii** (A. Gray) Benth. & Hook.; Hemsl. Biol. Centr. Am. **3**: 6. 1882.

Pentacrophys wrightii A. Gray, Am. Journ. Sci. II. **15**: 261. 1853.

Doctor Gray says that the flowers have 2 stamens, but those I examined had 5.

Specimens examined:

TEXAS: San Pedro, Pecos, and Limpio, *Wright* 1713, type collection.

2. **Acleisanthes acutifolia** Standley, sp. nov.

Perennial from a woody base; stems rather slender with minute and scattering pubescence composed of short, appressed, blunt, white hairs and, scattered among them, a few short, gland-tipped hairs; leaf blades lanceolate or elliptical, 4.5 cm. or less in length and 18 mm. or less wide, acute, narrowed to the base and somewhat decurrent upon the petioles, which are one-third or less as long as the blades, the margins wavy, both surfaces very sparingly puberulent; flowers short-pediceled, the pedicels about 3 mm. long; involucral bracts 3, linear, as long as the fruit or longer; flowers funnelform, 4 cm. long or more, rather densely puberulent without, the limb about 18 mm. wide; stamens 5, exserted; some of the flowers cleistogamous, their undeveloped perianths with 5 small stamens; fruit 7 to 8 mm. long, oblong, with 5 thick, smooth ribs separated by very shallow and inconspicuous depressions; ribs ending in small, knoblike bodies detached from the ribs proper by shallow depressions, the latter containing small glands.

The acute leaves with narrowed bases and short petioles will separate this plant from *A. wrightii*, with which it has been confused; it is also distinguished by its different fruits, pedicels, and bracts. In *A. wrightii* the glands are located at the very ends of the ribs instead of in depressions below their summits, as in this species. Type in the National Herbarium (no. 155669), collected at Maxon's Spring, Texas, by Havard. Also collected in the Santa Eulalia Mountains, Chihuahua, 1885, *Pringle* 671 (plant with rather shorter perianths and shorter pedicels than the type).

This is no. 1127 of the Mexican Boundary Survey and is figured in the Report of the Mexican Boundary Survey, plate 47, figures B, B_2, and B_3. Figure B_1 is *A. wrightii*.

3. **Acleisanthes anisophylla** A. Gray, Am. Journ. Sci. II. **15**: 261. 1853.

Specimens examined:

TEXAS: Rio San Pedro, *Wright* 1706, type collection; *Wright* 598.

4. **Acleisanthes longiflora** A. Gray, Am. Journ. Sci. II. **15**: 261. 1853.

Specimens examined:

TEXAS: *Wright* 599, type collection; *Wright* 1704; on the Llano under mesquite bushes on prairies, 1847, *Lindheimer* 679; 20 miles west of New Braunfels, 1846, *Lindheimer* 289; Coleman County, 1882, *Reverchon* 1346; Kimble County, 1885, *Reverchon;* prairies near Stanton, 1900, *Eggert;* near Laredo, 1899, *Mackenzie* 26; Laredo, 1879, *Palmer* 1115; near Laredo, 1901, *Eggert;* Sierra Blanca, 1895, *Mulford* 290; San Angelo, 1903, *Reverchon;* San Antonio, *E. H. Wilkinson* 126; San Antonio, 1901, *Bush* 865; Devils River, Valverde County, 1900, *Eggert;* Midland, 1902, *Tracy* 8312; plains west of Pecos, 1902, *Tracy;* Fort Clark, 1893, *Mearns* 1429, 1441; Mexican Boundary Survey 1123; Cibolo Canyon, 1881, *Havard;* Bexar County, *Jermy* 124; San Diego, 1885, *M. B. Croft* 6838; Knickerbocker Ranch, Tom Green County, 1880, *Tweedy* 35; Roma, 1889, *Nealley* 302; Ballinger, 1889, *Nealley* 370.

MEXICO: Parras, Coahuila, 1905, *Purpus* 1056; near Chihuahua, 1885, *Pringle* 101; Saltillo, 1848, *Gregg* 88; Buena Vista, 1847, *Gregg* 355.
NEW MEXICO: Delaware Creek, 1893, *Nealley* 12.
CALIFORNIA: Marie Mountains, Colorado Desert, eastern Riverside County, 1906, *E. E. Schellenger.*

The California specimen, received at a late day from Prof. H. M. Hall, of the University of California, extends the range of the species considerably to the northwest.

Attached to his no. 355 in the herbarium of the Missouri Botanical Garden is the following interesting note by Doctor Gregg regarding this plant: "*Yerba santa* (or *yerba de la rabia*); the root in a decoction is used for cholera, fevers, etc. Said to have acquired the name of *yerba santa* (holy herb) in 1814 on account of its wonderful virtues in curing a plague of that year."

4a. **Acleisanthes longiflora hirtella** Standley, subsp. nov.

Stems hirtellous throughout; leaves like those of the species, but broader and not attenuate, more or less puberulent on both surfaces, thick; otherwise like the species; "flowers white," the perianth more puberulent than in the species.

Type in the herbarium of the Missouri Botanical Garden collected near Saltillo, Coahuila, Mexico, September 20, 1848, *Gregg* 463. Gregg's 725 from "highlands near Patos" is probably the same; it has, however, very small leaves, and the collector says of it "flowers scarlet; a small shrub."

5. **Acleisanthes crassifolia** A. Gray, Am. Journ. Sci. II. **15**: 260. 1853.

Type locality, "High prairies of San Felipe Creek, W. Texas."

Specimens examined:

TEXAS: *Wright* 599, type collection; Van Horn, 1900, *Eggert.*

6. **Acleisanthes obtusa** (Choisy) Standley.

Nyctaginia obtusa Choisy in DC. Prod. **13**^{2}: 429. 1849.

Acleisanthes berlandieri A. Gray, Am. Journ. Sci. II. **15**: 260. 1853.

Doctor Gray in his description of *A. berlandieri* suspected that his species might be the same as the plant published by Choisy in the genus Nyctaginia. I have seen a specimen of the type collection of *N. obtusa* in the Engelmann Herbarium which leaves no room for doubt regarding the matter.

Specimens examined:

TEXAS: *Berlandier* 2007, type collection; San Fernando (Creek?), 1835, *Berlandier* 3044; between Rio Frio and Nueces, *Berlandier* 3203; Corpus Christi, 1860; Eagle Pass, *Havard;* Uvalde, 1880, *Palmer* 1117; Mexican Boundary Survey 1125; Roma, 1889, *Nealley* 228; San Antonio, 1882, *Letterman* 124; Dilley, 1905, *Reverchon;* Laredo, 1882, *Letterman.*

7. **Acleisanthes greggii** Standley, sp. nov.

Perennial; stems stout, lignescent, dichotomously much-branched, glabrous below, minutely puberulent above and on the younger branches; internodes short, 1 to 2 cm. long; leaf blades ovate, cordate or truncate at the base, very thick, 15 mm. long or usually less, glabrous, paler below, rather obtuse; petioles stout, one-half as long as the blades; flowers sessile, about 3 cm. long, tubes slender, limb 15 mm. wide, "white and pinkish purple within;" stamens 5, much exserted; flowers single or sometimes 2 or 3 together, each subtended by 2 or 3 thick, subulate bracts; fruit in the type not fully developed, but 5 mm. long and strongly 5-angled.

This Mexican plant differs from the Texan species, *A. obtusa*, in its smaller and thicker leaves, more branched and stouter stem, stouter petioles, and sessile flowers. Type in the herbarium of the Missouri Botanical Garden, collected at Monterey, Mexico, June 22, 1848, *Gregg* 157.

ACLEISANTHES NUMMULARIA Jones, Contr. Western Bot. **10**: 43. 1902. This, the only other species of the genus, was named from specimens collected near El Paso, Texas, but I have not been able to see specimens of the species.

11. HERMIDIUM S. Wats.

Hermidium S. Wats. Bot. King Explor. 286. 1871.

Perennial herbs, glabrous, erect; leaves opposite, entire, short-petioled, thick and fleshy; flowers at the ends of the branches or axillary, on short peduncles, 3 flowers on each peduncle, each flower pediceled and subtended by a large, ovate, leaf-like bract; calyx campanulate, purplish, slightly lobed; stamens 5 to 7, about as long as the perianth; fruit subspherical, smooth, glabrous.

A monotypic genus. The plant very closely resembles *Quamoclidion multiflorum* except in its involucral bracts, which are not united to form a calyx-like involucre, and in the shape of the perianth.

1. **Hermidium alipes** S. Wats. Bot. King Explor. 286. 1871.

Specimens examined:

NEVADA: Humboldt Valley, 1860, *S. Watson* 960, type collection; Palmetto Range, 1898, *Purpus* 5862; Wadsworth, 1902, *J. C. Jacobs* 458; Candelaria, *Shockley* 31.

CALIFORNIA: Panamint Canyon, 1897 *Jones;* Sierra Mountains, 1875, *Lemmon;* near Laws, 1906, *Heller* 8230.

UTAH: Willow Springs, 1891, *Jones.*

12. SENKENBERGIA Schauer.

Senkenbergia Schauer, Linnæa **19**: 711. 1847.
Lindenia Mart & Gal. Bull. Acad. Brux. **10**[2]: 357. 1843, not Benth. 1842.
Tinantia Mart & Gal. loc. cit. **11**[1]: 240. 1844, not Schiedw. 1839.
Boerhaavia of various authors in part, not L.

Perennial, erect herbs, glabrous or puberulent; leaves opposite, thick and fleshy, entire, petioled; flowers in bracted racemes; calyx red, funnelform, with a short, narrow tube, which expands gradually into the broad limb; fruit asymmetrical, gibbous, glaucous, 10-ribbed.

KEY TO THE SPECIES.

Steam and leaves glabrous; racemes solitary, not subtended by bract-like leaves	1. *S. gypsophiloides.*
Stem and leaves more or less puberulent; racemes of flowers panicled, the separate racemes subtended by bract-like leaves	2. *S. crassifolia.*

1. **Senkenbergia gypsophiloides** (Mart. & Gal.) Benth. & Hook. Gen. Pl. **3**: 6. 1880.

Lindenia gysophiloides Mart. & Gal. Bull. Acad. Brux. **10**[2]: 357. 1843.
Tinantia gypsophiloides Mart. & Gal. loc. cit. **11**[1]: 240. 1844.
Senkenbergia annulata Schauer, Linnæa **19**: 711. 1847.
Boerhaavia gibbosa Pavon; Choisy in DC. Prod. **13**[2]: 457. 1849.
Boerhaavia gypsophiloides Coulter, Contr. Nat. Herb. **2**: 354. 1894.

Specimens examined:

NEW MEXICO: La Luz Canyon, 1901, *Wooton;* Organ Mountains, 1893, *Wooton;* Organ Mountains, 1881, *Vasey;* Carlsbad, 1902, *Tracy.*

TEXAS: Devil's River, Valverde County, 1900, *Eggert;* El Paso, 1884, *Jones* 4216; Junction City, *Reverchon* 1584; Big Springs, 1900, *Eggert;* 1849, *Wright* 613; Bone Spring, 1889, *Nealley* 455.

MEXICO: Near Chihuahua, 1885, *Pringle* 693; Saltillo, 1898, *Palmer* 171; Tehuacan, Puebla, 1905, *Purpus* 1331; Ixmiquilpan, Hidalgo, 1905, *Purpus* 1438; Chihuahua, 1886, *Pringle* 987; between Monterey and Cerralvo, 1847, *Wislizenus* 340; 1848–49, *Gregg.*

2. **Senkenbergia crassifolia** Standley, sp. nov.

Perennial, 60 to 100 cm. high; stem rough-puberulent below, glabrous or glandular-viscid above; leaf blades thick, ovate, obtuse, broadly cuneate or truncate at the base, puberulent on both surfaces, 20 to 30 mm. long and 15 to 20 mm. wide; petioles puberulent, as long as the blades or a little shorter; flowers (not seen) in racemes, these in diffuse panicles, each raceme with very small bract-like leaves at the base, each flower subtended by a soon deciduous lanceolate bract; fruit reflexed on the very short pedicels, about 7 mm. long, gibbous, truncate above, tapering below, obscurely 10-nerved.

This species is near *S. gypsophiloides*, but differs in the panicled inflorescence with racemes subtended by bract-like leaves, and in the pubescent stems and broader and more thickly puberulent leaves. Type in the herbarium of the University of California, collected at Saltillo, Coahuila, Mexico, 1898, *Palmer* 172.

13. COMMICARPUS Standley.

Commicarpus Standley, gen. nov.

Boerhaavia L., in part.

Perennial plants with long and slender, climbing or reclining stems; leaves thin, mostly ovate-cordate, with conspicuous petioles, entire, opposite; flowers in umbels on moderately long pedicels; perianth short-funnelform, with a very short tube below the broad limb; flowers small; stamens exserted; fruit rather obscurely 10-ribbed, clavate, with numerous, rather large, mucilaginous glands scattered over its surface.

The plants included here have always passed as Boerhaavias, but they differ widely from the plants of that genus in the habit of the plant, form of the fruit, and shape of the perianth. *Boerhaavia scandens* and several related species were included by Doctor Heimerl[a] in the section Adenophorae of the genus Boerhaavia.

Type species, *Boerhaavia scandens* L.

The name alludes to the viscid fruit.

KEY TO THE SPECIES.

Pedicels glabrous; glands scattered irregularly over the fruit__ 1. *C. scandens.*
Pedicels pubescent; glands arranged in horizontal rows about the fruit_____ 2. *C. brandegei.*

1. **Commicarpus scandens** (L.) Standley.

Boerhaavia scandens L. Sp. Pl. 3. 1753.

Boerhaavia grahami A. Gray, Am. Journ. Sci. II. **15**: 323. 1853.

Type locality, "In Jamaica ad urbem jago de la vega."

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[a] Engler & Prantl, Pflanzenfam. 3^{1b}: 26.

Specimens examined:

WEST INDIES: Near Ponce, Porto Rico, 1902, *Heller* 6090; Nassau, Bahamas, 1903, *Curtiss* 16; Kingston, Jamaica 1890, *A. S. Hitchcock;* El Cobre, Cuba, 1902, *Pollard & Palmer.*

COLUMBIA: Santa Marta, 1898–01, *H. H. Smith*, 571.

MEXICO: Guaymas, Sonora, 1887, *Palmer* 146; Hermosillo, 1892, *Brandegee;* Altata, Sinaloa, 1904, *Brandegee;* Culiacan, Sinaloa, 1904, *Brandegee;* San Gregorio, Baja California, 1890, *Brandegee* 483; Ixmiquilpan, Hidalgo, 1905, *Purpus* 1437; Guaymas, 1897, *Maltby* 192; San Luis Potosi, 1878, *Parry & Palmer* 772; rocky hills of the Sonoita, Sonora, 1851–52, *Wright* 1715; Oaxaca Valley, Oaxaca, 1894, *C. L. Smith* 859; Villa Union, Sinaloa. 1895, *F. H. Lamb* 388; Santa Cruz, Sonora, 1852, *Thurber* 2305.

ARIZONA: Tucson, 1894, *Toumey;* Santa Catalina Mountains, 1885, *Pringle;* Santa Catalina Mountains, 1883, *Lemmon;* Camp Grant, 1867, *Palmer* 212; Lowell, 1884, *Parish;* head of the Cienega, 1874, *Rothrock* 590.

TEXAS: Bofecillos, 1881, *Havard.*

2. **Commicarpus brandegei** Standley, nom. nov.

Boerhaavia elongata Brandeg. Proc. Cal. Acad. II. **2**: 199, 1889, not Salisb. Prod. 56. 1796.

This closely resembles *C. scandens* in general appearance. The flowers, however, are much larger, 8 to 10 mm. in diameter and much longer than the small ovary; the pedicels are pubescent instead of glabrous; the leaves are distinctly mucronate or apiculate, and the fruit has mucilaginous glands which form horizontal bands about it instead of being scattered irregularly as in *C. scandens.*

Specimens examined:

BAJA CALIFORNIA: San Pablo, 1889, *Brandegee*, type; Jesus Maria, 1889, *Brandegee;* Arroyo Salado, 1901, *Purpus* 243.

2a. **Commicarpus brandegei glabrior** Standley, subsp. nov.

In general appearance and in the form of the fruit and size of the perianths this plant resembles the species. The stem, however, and especially the pedicels, are more slender; the pedicels are glabrous instead of pubescent, and the leaves are broadly lanceolate and apiculate.

Type in the herbarium of the University of California (no. 101287), collected at San José del Cabo, Baja California, September 29, 1893, *Brandegee.*

14. ANULOCAULIS Standley.

Anulocaulis Standley, gen. nov.

Boerhaavia of various authors, in part, not L.

Perennial herbs, stout and erect; stems glabrous, but the middle of each internode usually provided with a reddish ring which exudes a mucilaginous fluid; leaves with very thick, rigid, rather fleshy blades, opposite, margins frequently lacerate, petioled; flowers in small clusters, these variously arranged, sessile or pediceled, sometimes subumbellate, the clusters subtended by a few small bracts; perianth funnelform with a prominent tube; fruit turbinate or biturbinate, rather obscurely 10-ribbed.

There is no good reason why plants which differ so markedly as these from typical Boerhaavias should be included in the genus Boerhaavia. Such treatment is certainly not conducive to generic unity. The plants included in the new genus may be separated at once by their distinct general appearance, due especially to their large, thick leaves, the shape of the perianth which has a

distinct tube instead of being campanulate, and the 10-ribbed fruit of different shape.

Doctor Heimerl[a] placed *Boerhaavia leiosolena* and *B. eriosolena* in a separate section of the genus, which he named Solenanthae. He remarks that these two plants differ very much from the other species of the genus, but he did not see fit to separate them more definitely.

Type species, *Boerhaavia eriosolena* A. Gray.

KEY TO THE SPECIES.

Fruit obconical in outline, depressed above ---------- 1. *A. eriosolenus.*
Fruit biturbinate.
  Flowers 5 to 9 mm. long; leaves conspicuously glandular-dotted ---------- 2. *A. annulatus.*
  Flowers 20 mm. long; leaves not glandular-dotted ------ 3. *A. leiosolenus.*

1. Anulocaulis eriosolenus (A. Gray) Standley.

Boerhaavia eriosolena A. Gray, Am. Journ. Sci. II. **15**: 322. 1853.

Specimens examined:

MEXICO: Azufrora near Saltillo, 1848, *Gregg* 512, type collection; Viesca, Coahuila, 1905, *Purpus* 1053; Torreon, Coahuila, 1903, *Purpus.*

TEXAS: Bluffs of the Rio Grande, 1883, *Havard* 58; Mexican Boundary Survey 1138.

2. Anulocaulis annulatus (Coville) Standley.

Boerhaavia annulata Coville, Contr. Nat. Herb. **4**: 177. 1893.

Specimens examined:

CALIFORNIA: Furnace Creek Canyon, Funeral Mountains, 1891, *Coville & Funston* 577, type; Panamint Canyon, 1897, *Jones.*

3. Anulocaulis leiosolenus (Torr.) Standley.

Boerhaavia leiosolena Torr. Bot. Mex. Bound. 172. 1858.

Specimens examined:

TEXAS: Mexican Boundary Survey 1139, type collection; Dallas Creek, 1881, *Havard;* Tornillo Creek, 1883, *Havard.*

NEVADA: Muddy Creek, 1898, *Purpus* 6155.

15. BOERHAAVIA L.

Boerhaavia L. Sp. Pl. 3. 1753.

Annual or perennial herbs, slender, glabrous or pubescent, often with glandular rings about the internodes; leaves opposite, the blades unequal, entire, petioled or sessile; flowers small, variously arranged, each usually subtended by 1 or 2 minute bracts, on jointed pedicels; perianth campanulate, 5-lobed; stamens 1 to 5, exserted or included, with very slender filaments which are united at the base; fruit club-shaped to obpyramidal, 3 to 5-ribbed, 3 to 5-angled, or sometimes with 3 to 5 low, thick, not membranous wings.

Type species, *Boerhaavia erecta* L.

The genus has probably a wider distribution than any other of the genera of the Allioniaceae. It includes about fifty species besides those mentioned here. They occur through the southern part of the United States, through Mexico, the West Indies, a large part of South America, and the islands of the Pacific, including Australia, and through southern and eastern Asia, Africa, and Spain.

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[a] Engler & Prantl, Pflanzenfam. 3^{1b}: 26, 1889.

The individual species differ from those of Abronia in that they often extend over relatively large areas; wide distribution seems to be characteristic of a majority of the species. *B. erecta* is a good example of such distribution.

Doctor Heimerl divided the genus (as it is defined here) into two sections, the first, Pterocarpon, containing *B. pterocarpa* (several other related species such as *B. alata* and *B. megaptera* should be included here); and the second, Micranthae, including the rest of the species. The two sections are hardly worthy of being maintained. The wings of the former section differ from the ridges of the second merely in degree and it would be difficult to tell to which some of the species should be referred. The genus as it is defined here is composed of closely related species and is the most satisfactory of the large genera of the family in this respect.

KEY TO THE SPECIES.

Fruit with distinct, rather thick, not membranous wings; annuals; flowers umbellate.	
Umbels either axillary or terminal, but never paniculed	1. *B. pterocarpa.*
Umbels arranged in panicles.	
Wings of the fruit only slightly narrowed below; umbels with only 2 or 4 flowers or the flowers frequently solitary; flowers 3 mm. long	2. *B. alata.*
Wings of the fruit considerably narrowed below; umbels containing 5 or 6 flowers; flowers about 1 mm. long	3. *B. megaptera.*
Fruit not winged; the ribs sometimes almost wing-like, but very thick and coriaceous.	
Flowers 5 mm. wide or more; perennials.	
Leaves ovate or oval	21. *B. anisophylla.*
Leaves linear or narrowly lanceolate.	
Margins of the leaves strongly revolute; leaves thick; stamens mostly 5	22. *B. tenuifolia.*
Margins of the leaves not revolute or but slightly so; leaves broader and thin; stamens mostly 3; plants larger and stouter.	
Stems hispid below, glandular above	23. *B. linearifolia.*
Stems glandular-pubescent throughout	23a. *B. linearifolia glandulosa.*
Flowers less than 5 mm. wide.	
Flowers solitary at the ends of the peduncles; perennials.	
Fruit glabrous; flowers about 1 mm. wide	19. *B. organensis.*
Fruit viscid; flowers from 3 to almost 5 mm. wide	20. *B. gracillima.*
Flowers not solitary at the ends of the branches.	
Flowers umbellate or subumbellate at the ends of the peduncles.	
Fruit glabrous; annuals.	
Fruit subtended by conspicuous, persistent, large bracts; plants glandular	9. *B. purpurascens.*

Bractlets deciduous or very small and inconspicuous; plants very sparingly if at all glandular.
Fruit with 3 or 4 broad, thick, wing-like ridges, the body strongly rugulose; leaves thick, paler below; flowers 1 mm. long, with two or three stamens_____ 4. *B. triquetra.*
Fruit with 5 lower, thick, wing-like ridges; leaves mostly thinner.
Leaves lanceolate.
Flowers 2 or 3 mm. long, solitary or 2 or 3 in a fascicle; leaves brown-dotted; wings of fruit much larger than in members of the *B. erecta* group_____ 5. *B. maculata.*
Flowers about 1.5 mm. long, sessile, collected in small heads; leaves black-dotted; wings of the fruit comparatively thin_____ 6. *B. universitatis.*
Leaves mostly ovate or elliptical, not lanceolate.
Leaves black-dotted beneath, irregularly ovate, acutish, thin; fruit mostly in compound umbels, conspicuously pediceled_____ 7. *B. erecta.*
Leaves not black-dotted beneath.
Plant tall, erect; leaves ovate, acute, wavy-margined; flowers in compound umbels_____ 7a. *B. erecta thornberi.*
Plant low, spreading or ascending; leaves mostly elliptical, obtuse, not wavy-margined; flowers in heads, or in simple but not in compound umbels_____ 8. *B. intermedia.*
Fruit glandular-viscid; perennials.
Fruit scarcely sulcate; clusters at the ends of the peduncles few-flowered; stems almost or quite glabrous; leaves thin, obtuse, usually paler beneath_____ 10. *B. paniculata.*
Fruit more prominently sulcate; clusters at the ends of the peduncles many-flowered.

Fruit obtuse; leaves of about the same color on both surfaces, broadly obtuse at the base; stems or petioles or both hirsute; panicle loosely branched.
Fruit acutish; leaves paler below, mostly narrowed or cuneate at the base; inflorescence mostly axillary, seldom forming a much-branched panicle.
Leaves strongly apiculate_____ 12. *B. viscosa apiculata.*
Leaves not strongly apiculate.
Stems glandular-pubescent; peduncles and pedicels always glandular_____ 12. *B. viscosa.*
Stems almost glabrous, or pulverulent below_____ 12b. *B. viscosa oligadena.*
Flowers forming slender, simple, spike-like racemes, which are usually arranged in panicles; annuals.
Ribs 4, very acute; bracts large and persistent; fruit very obtuse or truncate above_____ 18. *B. wrightii.*
Ribs 5; fruit never truncate above.
Ribs of the fruit thick, smooth, obtuse, with very narrow, almost straight channels between them.
Stamens included; stems very finely puberulent; plant spreading and much branched; leaves thin_____ 13. *B. watsoni.*
Stamens exserted; stems more or less hirsute below, especially in young plants; flowers 2 mm. long or more, forming thicker spikes_____ 14. *B. coulteri.*
Ribs of the fruit thin, acute, rugulose, with wide and shallow spaces between them.
Stamens included; flowers about 1 mm. long; bracts lanceolate; plant glandular_____ 17. *B. torreyana.*
Stamens exserted.
Flowers 2 mm. long, conspicuously brown-nerved; stamens 1 or 2; bracts ovate, red-dotted_____ 15. *B. spicata,*

Flowers 3 mm. long or more, white; stamens 2 or 3; bracts narrowly ovate or lanceolate	16. *B. xanti.*

1. **Boerhaavia pterocarpa** S. Wats. Proc. Am. Acad. **17**: 376. 1882.

Type locality, "Apache Pass, Arizona."

Specimens examined:

ARIZONA: Tucson, 1892, *Toumey;* Tucson, 1903 and 1904, *Thornber* 259, 548.
MEXICO: Near Altar, Sonora, 1904, *Griffiths* 6887.

2. **Boerhaavia alata** S. Wats. Proc. Am. Acad. **24**: 69. 1889.

Specimens examined:

MEXICO: Guaymas, 1887, *Palmer* 332, type collection.

A sheet of Palmer's in the herbarium of the University of California and one in the National Herbarium bearing this number contain a very different plant described elsewhere as a new species.

3. **Boerhaavia megaptera** Standley, sp. nov.

Annual; erect, about 30 cm. high; branched from near the base; stems slender, sparingly short-puberulent; leaf blades 20 to 25 mm. long and 8 to 12 mm. wide, narrowly elliptical to almost linear above, of about the same color on both surfaces, rather obtuse or mostly acute at the apex, obtuse at the base; petioles about one-half as long as the blades; branches of the inflorescence alternate, forming a narrow panicle; peduncles 1 cm. long or more, each bearing an umbel of 3 to 5 pedicellate flowers; perianth about 1 mm. long or slightly longer, pinkish; fruit 3.5 mm. long and about 2.5 mm. wide, with 5 thin, broad wings, these only slightly narrowed toward the base and above rounded slightly above the body of the fruit; body and wings glabrous and smooth, not at all rugulose.

The only species with which this is likely to be confused is *B. alata*, from which it may be distinguished by its fruit being acute below, while that of the latter species is only slightly narrowed; by the fact, also, that the fruit is collected in fascicles of 5 or 6 and is on shorter pedicels, and that the flowers of the new species are much smaller. The fruit of the plant might almost place it in Selinocarpus, but the wings, although large, are not membranous as in that genus; the habit and flowers, too, show at once that it is a Boerhaavia rather than a Selinocarpus, for which it has been mistaken. Type in the herbarium of the University of Arizona, collected by Prof. J. J. Thornber on Flattop Mountain, Tucson Mountains, altitude 850 meters, September 8, 1903, no. 162.

4. **Boerhaavia triquetra** S. Wats. Proc. Am. Acad. **24**: 69. 1889.

Specimens examined:

MEXICO: Los Angeles Bay, Lower California, 1887, *Palmer* 521, type collection, and no. 603.

5. **Boerhaavia maculata** Standley, sp. nov.

Annual, erect; stems slender, much branched, minutely puberulent below or mostly glabrous, brown-dotted, not glutinous above; blades lanceolate, about 25 mm. long and 5 mm. wide, acute, rounded at the base, brown-dotted on both surfaces, paler below, mostly glabrous; petioles very short; inflorescence paniculate, much branched; flowers 2 or 3 mm. long, single or 2 or 3 in a fascicle, on

slender pedicels which are 6 mm. long or less; stamens included; fruit narrowly obpyramidal in outline, almost 4 mm. high, truncate above, acute below, with 5 comparatively thin, narrow, transversely wrinkled wings.

Type U. S. National Herbarium no. 22937, cotype in the herbarium of the University of California; collected at Guaymas, Sonora, Mexico, 1887, *Palmer* 332, in part. The type sheet of *B. alata* S. Wats. also bears the same number, but the plant is different, its fruit having thick, corrugated wings, while that of *B. alata* has much wider, thin, and rather membranous wings, which are but little narrowed below. From *B. triquetra* this species is distinguished by its larger fruit, its wider and more numerous wings, and the much narrower spaces between the wings.

On the sheet in the National Herbarium which contains the type is a packet containing fruit which seems not to belong to this plant, and which is probably the fruit of an undescribed species, for it does not seem to agree with that of any plant reported from Guaymas.

6. Boerhaavia universitatis Standley, sp. nov.

Annual erect, branched from near the base; stems with a short, rather pulverulent pubescence on almost every part, slender, conspicuously brown-dotted; leaf blades lanceolate, 20 to 50 mm. long and 5 to 10 mm. wide, acute, rather obtuse at the base, of about the same color on both surfaces, conspicuously black-dotted below; petioles very short; branches of the inflorescence alternate, paniculate, slender; ultimate peduncles 10 to 12 mm. long; flowers almost sessile, in umbels of about 5, whitish, 1.5 mm. long; fruit 2.5 mm. long, very narrowly obpyramidal, with 5 thin, winglike ridges which are truncate above, the body of the fruit rugulose between the wings.

This is nearest *B. intermedia*, from which it differs in its black-dotted leaves and stems, lanceolate leaves, and more distinctly winged fruit. From *B. erecta* it is distinguished by its narrower leaves, by the arrangement of the flowers in umbels, all of the pedicels being attached at the very end of the peduncle instead of at various points near its end, and by its more distinctly winged fruit. Type in the herbarium of the University of Arizona, collected by Thornber, September 2, 1903, on the campus of the university, Tucson, Arizona; altitude 740 meters.

Other specimens examined:

ARIZONA: Corralitas to El Paso, *Thurber* 732; Tucson, 1867, *Palmer* 213.

TEXAS: No locality, 1881, *Havard;* 1849, *Wright* 609. Mexican Boundary Survey 1133, in part.

7. Boerhaavia erecta L. Sp. Pl. 3. 1753.

Type locality, "In Vera Cruce."

An erect annual; stems usually reddish below, simple at the base but branched above, glabrous, or roughened below; leaf blades oblong-ovate, mostly obtuse or acutish, 30 or 40 mm. long and 25 mm. wide, rounded or broadly cuneate at the base, glabrous, paler beneath, black-dotted on the lower surface, the upper blades narrower and more acute; inflorescence dichotomously paniculate-branched; flowers about 1 mm. long, the perianth sparingly hispid; stamens exserted; fruit in clusters of 3 to 6 at the ends of the slender peduncles, the pedicels not attached at the very end of the peduncle, but at various points near the end, each fruit on a pedicel as long as itself or shorter; fruit 3 or 4 mm. long, narrow, truncate above, narrowly obpyramidal, with 5 ridges which are low but distinct, the spaces between them more or less rugulose; fruit usually green.

Specimens examined:

MEXICO: Coast south of Pescadero, Baja California, 1893, *Brandegee;* Culiacan, Sinaloa, 1904, *Brandegee;* Zacuapan, Vera Cruz, 1906, *Purpus* 1929; Yucatan, 1895, *Gaumer* 361; Yucatan, 1896, *Valdez* 91; Acapulco, 1894–95, *Palmer* 309, in part; San José del Cabo, Baja California, 1890, *Brandegee* 485; Guaymas, 1887, *Palmer* 182; Cape Region, Baja California, 1899, *Brandegee;* Monterey, 1902, *Pringle* 11139; Manzanillo, 1890, *Palmer* 907.

ARIZONA: Beaver Creek, 1883, *Rusby* 791; Plants of the Hopis, *Millspaugh* 214; Ehrenberg, 1902, *Mrs. F. Stephens;* Oracle, 1905, *Thornber.*

COLORADO: *E. Hall,* without locality, the label probably wrong.

FLORIDA: Jacksonville, 1894, *Curtiss* 5115; Eustis, 1894, *Nash* 973; Apalachicola, 1888, Chapman Herbarium 1638b; Myers, 1900, *Hitchcock;* South Jacksonville, 1895, *Lightpipe* 414; Sarasota Bay, 1890, *J. H. Simpson* 89; Key West, 1874, *Palmer* 455.

ALABAMA: Auburn, 1897, *Earl & Baker.*

MISSISSIPPI: 1880, *Langlois;* Biloxi, 1900, *Tracy* 6891; Ocean Springs, 1895, *Skehan.*

GEORGIA: Albany, 1895, *Small.*

SOUTH CAROLINA: Aiken, 1869, H. R[avenel]. (National Herbarium).

ARKANSAS: Fulton, 1900, *Bush* 1060.

LOUISIANA: *Hale,* without locality; Lake Charles, 1899, *Mackenzie* 501.

TEXAS: Bracken, Comal County, 1903, *Groth* 157; Dallas, 1879, *Reverchon;* Galveston Island, 1901, *Tracy* 7663; Waco, *L. Pace* 38; Dallas, 1899, *Eggert;* Graniteville, 1899, *Eggert;* Palestine, 1899, *Eggert;* White Hall, Grimes County, 1888, *Pammel;* Dallas County, 1877, *Reverchon* 792; Columbia, 1900, *Bush* 1457; San Antonio, 1898, *E. H. Wilkinson* 198; Houston, 1899, *Bush* 258; near San Antonio, 1900, *Eggert;* Rusk County, *Vinzent* 67; Austin, *J. F. Joor;* Bexar County, *Jermy* 57, 112; Hempstead, 1894, *Thurow* 7.

NICARAGUA: Asseradores Island, Chinandega, 1903, *Baker* 2134.

VENEZUELA: Island of Margarita, 1901, *Miller & Johnston.*

COLOMBIA: Santa Marta, 1898–1901, *H. H. Smith.*

GUATEMALA: Puerto Barrios, 1905, *Pittier* 381; Moran, Departmento Amatitlan, 1905, *Kellerman* 4535.

WEST INDIES: Martinique, 1892, *Duss* 2175; Guadeloupe, 1892, *Duss* 2175; St. Croix, Danish West Indies, 1896, *Rickseeker* 401; Coamo Springs, Porto Rico, 1902, *Heller* 6107.

7a. **Boerhaavia erecta thornberi** (Jones) Standley.

Boerhaavia thornberi Jones, Contr. Western Bot. **12**: 72. 1908.

This is scarcely separable from *B. erecta,* as a species at least. The plant is erect and rather more slender than the species, and its leaves are without black dots beneath. Aside from these minor differences there seems to be little variation from typical *B. erecta.*

Specimens examined:

ARIZONA: Tucson, 1903, *Thornber* 10, type; Tucson, 1903, *Thornber* 339; Fort Huachuca, 1894, *Wilcox* 321; Beaver Creek, 1883, *Rusby;* Rincon Mountains, 1891, *Nealley* 145.

MEXICO: Guadalupe Canyon, Sonora, 1893, *E. C. Merton* 2045.

Wright 1724, 1720 in National Herbarium.

Metcalfe's 787 from Mangas Springs, New Mexico, is probably a slender and depauperate form of this variety; another plant from the same locality, 1897, J. G. Smith 26, is even more depauperate and has brown-dotted leaves, thus connecting the variety directly with *B. erecta*.

8. **Boerhaavia intermedia** Jones, Contr. Western Bot. **10**: 41. 1902.

Specimens examined:

TEXAS: El Paso, 1883, *Jones* 4173, type collection; Chenate Mountains, 1889, *Nealley* 257; canyon west of Tarlinga, 1883, *Havard;* Presidio, *Trelease* 358a.

MEXICO: Hills near Chihuahua, 1886, *Pringle.*

NEW MEXICO: Organ Mountains, 1895, *Wooton;* Mesilla Valley, 1907, *Standley;* plains of the Rio Gila, 1880, *Greene* 278.

ARIZONA: Tempe, 1901, *Kearney* 135; foothills of the Santa Catalina Mountains, 1881, *Pringle;* ? Apache Pass, Chiracahua Mountains, 1881, *Lemmon;* Tucson Mountains, 1903, *Thornber* 161; ? Antelope, 1902, *Purpus* 83.

CALIFORNIA: Southwestern part of the Colorado Desert, San Diego County, 1890, *Orcutt* 2090.

9. **Boerhaavia purpurascens** A. Gray, Am. Journ. Sci. II. **15**: 321. 1853.

Specimens examined:

NEW MEXICO: Copper Mines, 1851–52, *Wright* 1725, type collection; Carlisle, 1902, *Wooton;* Mogollon Mountains, 1880, *Rusby* 352; banks of the Gila, *Greene;* Mogollon Mountains, 1881, *Rusby* 7018; east fork of the Rio Gila, 1900, *Wooton.*

ARIZONA: Apache Pass, Chiracahua Mountains, 1881, *Lemmon;* Fort Whipple, 1865, *Coues & Palmer* 433; Fort Huachuca, 1894, *Wilcox.*

MEXICO: Near Chihuahua, 1887, *Palmer* 1582; ? Copradia, 1904, *Brandegee;* Guadalupe Canyon, Sonora, 1893, *E. C. Merton* 2044.

10. **Boerhaavia paniculata** L. C. Rich. Act. Soc. Hist. Nat. Par. 1: 105. 1792.

Specimens examined:

FLORIDA: Eustis, 1894, *Nash* 974; Key West, 1874, *Palmer;* Punta Rossa, 1900, *Hitchcock* 284; Soldiers Key, 1904, *Britton* 333; Eustis, 1894, *Hitchcock;* Key West, 1904, *Lansing* 2078; Newport, Key Largo, 1898, *Pollard, Collins & Morris* 176; Miami, 1877, *Garber;* Sanibel Island, 1901, *Tracy* 7664.

WEST INDIES: Cieneguito, Cuba, 1895, *Rob Combs* 104; Santiago, Cuba, 1902, *Palmer* 370; Nueva Gerona, Isla de Pinos, 1904, *Curtiss* 359; Jamaica, 1892, *Lloyd* 1099; Martinique, *Duss* 2174; Guadeloupe, 1892, *Duss* 2174.

VENEZUELA: Island of Margarita, 1901, *Miller & Johnston* 203.

NORTH CAROLINA: "In oriente Carolina Septentrionali, locis navalibus," 1885, *G. McCarthy* 169.

11. **Boerhaavia hirsuta** Willd. Phyt. 1. 1794.

Specimens examined:

FLORIDA: Manatee County, 1887, *J. I. Rothrock.*

WEST INDIES: El Cobre, Cuba, 1902, *Pollard & Palmer* 395; Santiago de las Vegas, Cuba, 1904, *Wilson* 1147; ? Coamo circa Salinas, Porto Rico, *Sintenis* 3293; Grand Cayman, 1891, *Hitchcock;* Bassin, Danish West Indies, 1897, *Mrs. J. J. Ricksecker.*

NEW MEXICO: Gila Valley, 1880, *Greene.*

TEXAS: Brownsville, 1895, *Townsend* 29; Victoria, 1900, *Eggert;* 1844, *Lindheimer* 294.

ARIZONA: 1881, *Pringle;* Little Meadows, 1902, *Mrs. F. Stephens;* Santa Catalina Mountains, 1894, *Toumey;* Tucson, 1892, *Toumey* 473.

CALIFORNIA: ? Middle Tule River, 1897, *Purpus* 5009; base of San Jacinto Mountains, 1881, *Parish* 590; San Jacinto Plains, 1892, *Hasse.*

MEXICO: Torreon, Coahuila, 1898, *Palmer* 487; Durango, 1896, *Palmer* 299; Palm Valley, Lower California, 1883, *Orcutt;* Socorro Island, 1903, *Barkelew* 205; San Gregorio, Lower California, 1889, *Brandegee;* Patrocinia, Lower California, 1889, *Brandegee;* Comondu, Lower California, 1889, *Brandegee;* Hermosillo, Sonora, 1892, *Brandegee;* ? Yucatan, 1895, *Gaumer* 309; San José del Cabo, Lower California, 1897, *Anthony* 356; near San Pablo, 1847, *Gregg* 542.

12. **Boerhaavia viscosa** Lag. & Rodr. Anal. Cienc. Nat. **4**: 256. 1801.

Specimens examined:

MEXICO: Durango, 1896, *Palmer* 300; Valley of Cuantla, Morelos, 1901, *Pringle* 9308; Acaponeta, Tepic, 1895, *F. H. Lamb* 528; near Chuichupa, Chihuahua, 1899, *Barber & Townsend* 408; Oaxaca Valley, Oaxaca, 1894, *C. L. Smith* 774; San José del Cabo, Lower California, 1890, *Brandegee* 486; Oaxaca, 1900, *C. C. Deam;* near Yautepec, Morelos, 1904, *Pringle* 13177; environs de Mexico, *Berlandier* 577; Acapulco, 1894–95, *Palmer* 308; near City of Mexico, 1849, *Gregg* 615.

NEW MEXICO: ? Florida Mountains, 1895, *Mulford* 1094.

12a. **Boerhaavia viscosa apiculata** Standley, subsp. nov.

Perennial, ascending; stems slender, minutely and sparsely puberulent throughout, slightly glandular above, the stem appearing glabrous to the naked eye; internodes long, 8 to 12 cm.; leaf blades broadly ovate, obtuse at the apex and conspicuously apiculate, broadly rounded at the base; petioles about one-half as long as the blades; branches of the inflorescence very slender, forming a narrow, mostly alternately branched panicle; fruit like that of the species.

Type collected at Copradia, near Culiacan, Sinaloa, Mexico, October 20, 1904, *Brandegee* (in the herbarium of the University of California).

12b. **Boerhaavia viscosa oligadena** Heimerl, Ann. Cons. et. Jard. Genev. **5**: 189. 1901.

Boerhaavia ramulosa Jones, Contr. Western Bot. **10**: 40. 1902.

This differs from *B. viscosa* in the following particulars: The stems are not glandular below but have a short, scattered, appressed, almost pulverulent pubescence; the petioles and the branches of the inflorescence, especially the pedicels, have a short, close, glandular pubescence. The variety is founded on two sheets, one collected in the Organ Mountains, New Mexico, 1897, *Wooton* 421; the other collected on Perico Island, Florida, 1900, *Tracy* 6654. The two plants, although widely separated geographically, appear to be the same in all essential characters.

Specimens examined:

FLORIDA: Tampa, 1895, *Nash* 2466; Sarasota, 1876, *Garber;* Caloosa, 1878, *Garber;* southern Florida, Chapman Herbarium; Marco, 1900, *Hitchcock* 283; Florida, 1842–49, *F. Rugel* 286; Perico Island (see notes above).

PORTO RICO: Two miles west of Ponce, 1902, *Heller* 6220.

TEXAS: Corpus Christi, 1894, *Heller* 1792; San Antonio, *E. H. Wilkinson* 129a; Austin, 1872, *E. Hall* 532; Austin, 1884, *Joor;* San Antonio, 1900, *Eggert;* Waco, 1904, *L. Pace;* Laredo, 1899, *Mackenzie* 47; El Paso, 1885, *Jones*, type collection of *B. ramulosa.*

NEW MEXICO: Mangas Springs, 1903, *Metcalfe* 808; Byer's Spring, 1895, *Mulford* 1035; Organ Mountains, 1894, and several other dates, *Wooton;* south end of the Black Range, 1904, *Metcalfe;* Organ Mountains (see notes above).

ARIZONA: Santa Cruz Valley near Tucson, 1881, *Pringle;* Galluno Mountains, 1894, *Toumey;* Tucson, 1880, *Engelmann;* foothills of the Tucson Mountains, 1901, *Thornber;* Tucson, 1892, *Toumey;* Fort Chittenden to Patagonia, 1903, *Griffiths* 6120; Mexican boundary line south of Bisbee, 1892, *Mearns* 938; Santa Catalina Mountains, 1883, *Lemmon;* Fort Huachuca, 1891, *Wilcox.*

13. **Boerhaavia watsoni** Standley, sp. nov.

Boerhaavia spicata palmeri S. Wats. Proc. Am. Acad. **24**: 70. 1889, not *B. palmeri* S. Wats. loc. cit.

Specimens examined:

MEXICO: Guaymas, 1887, *Palmer* 141, type collection; Sonora, *Thurber* 992.

CALIFORNIA: Santa Catalina Mission, 1889, *Orcutt.*

These Arizona collections are of rather doubtful determination; they seem to have the small flowers, included stamens, and slender spikes of *B. watsoni,* yet their localities should place them rather with *B. coulteri:*

ARIZONA: Tucson, 1896, *Toumey;* Oak Creek, 1903, *Purpus* 8243; Wilmot, 1903, *Thornber* 137; Tucson, *Thornber* 338; Cochise, 1900, *Griffiths* 1911; Camp Verde, 1891, *Toumey;* Fort Verde, 1891, *MacDougal;* Arizona, 1889, *Vasey.*

The following are referred here because of their fruit; they are considerably more viscid than the type:

ARIZONA: Small range reserve near Tucson, 1903, *Griffiths* 6161; fenced area, Santa Rita Forest Reserve, 1903, *Griffiths* 5988.

14. **Boerhaavia coulteri** (Hook.) S. Wats. Proc. Am. Acad. **24**: 70. 1889.

Senkenbergia coulteri Hook. f. in Benth. & Hook. Gen. Pl. **3**: 6. 1880.

The following should probably be included in this species according to Doctor Watson's interpretation; they differ only slightly from his description of the type, which I have not seen:

ARIZONA: Foothills of the Santa Catalina Mountains, 1881, *Pringle;* Rincon Mountains, 1894, *Toumey;* Mexican Boundary Survey, *Schott.*

15. **Boerhaavia spicata** Choisy in DC. Prod. **13**[2]: 456. 1849.

Type locality, Mexico.

Of this species, so well discussed by Doctor Watson,[a] who had seen a portion of the type material, I have seen only one sheet of whose identity it is possible to feel at all certain, one collected at Culiacan, Sinaloa, Mexico, August 20, 1904, *Brandegee.*

16. **Boerhaavia xanti** S. Wats. Proc. Am. Acad. **24**: 69. 1889.

Type locality, "Cape Saint Lucas" (Mexico).

Specimens examined:

MEXICO: Guaymas, 1887, *Palmer* 681; San José del Cabo, Lower California, 1890, *Brandegee* 484; Binorama (Cape Region, Lower California), 1899, *Brandegee.*

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[a] Proc. Am. Acad. **24**: 70. 1889.

17. Boerhaavia torreyana (S. Wats.) Standley.

Boerhaavia spicata torreyana S. Wats. Proc. Am. Acad. **24**: 70. 1889.

No type locality was mentioned in the original description and no type specimen. The range of the variety was given as "Texas, New Mexico, and Arizona." The plant is more glandular than *B. coulteri*, and is a stouter plant with thicker and glandular leaves.

Specimens examined:

NEW MEXICO: Albuquerque, 1884, *Jones* 4131; near Silver City, 1880, *Greene;* Tortugas Mountain, near Las Cruces, 1902, *Metcalfe;* Florida Mountains, 1895, *Mulford* 1007; south of the White Sands, 1897, *Wooton* 407; Deming, 1895, *Mulford* 1034; near Las Cruces, 1906, *Standley;* Chama River, 1904, *Wooton* 2824; near McCarty's Ranch, 1880, *Rusby* 357; Las Cruces, 1881, *Vasey.*

ARIZONA: Holbrook, 1896, *Myrtle Zuck;* northeastern Arizona, 1896, *Hough* 10; Fort Huachuca, 1894, *Wilcox* 290.

TEXAS: Tornillo Creek, 1883, *Havard* 63, in part; Hueco Tanks, 1895, *Mulford* 127; Presidio, *Trelease* 358.

The following sheets are doubtful, but should probably be referred here:

NEW MEXICO: Florida Mountains, 1895, *Mulford* 1115.

ARIZONA: Beaver Creek, 1183, *Rusby.*

MEXICO: Torreon, Coahuila, 1898, *Palmer* 488.

18. Boerhaavia wrightii A. Gray, Am. Journ. Sci. II. **15**: 322. 1853.

Boerhaavia bracteosa S. Wats. Proc. Am. Acad. **20**: 370. 1885.

Specimens examined:

TEXAS: *Wright* 610, type collection; El Paso to Monument 53, 1892, *F. Wagner* 987, a form with linear or narrowly lanceolate leaves; near Great Canyon of the Rio Grande, 1883, *Havard* 62, type collection of *B. bracteosa.*

NEW MEXICO: Mesa west of the Organ Mountains, 1904, *Wooton;* near Las Cruces, 1895, *Wooton.*

ARIZONA: Cienega, 1874, *Rothrock* 570; Grand Canyon, 1901, *Leiberg* 5933; Arizona, 1885, *Jones.*

NEVADA: Wheeler's Expedition 1872.

19. Boerhaavia organensis Standley, sp. nov.

Annual ?, low, 20 to 25 cm. high, branched from the base; stems minutely puberulent below, glutinous above; blades 2 cm. long or less, elliptical to lanceolate, thick, glabrous, paler below, rather obtuse at both ends, the petioles short and thick; inflorescence diffusely paniculate, the branches rather stouter than in *B. gracillima;* flowers solitary on filiform pedicels which vary in length from 1 cm. to shorter than the flower; no very good flowers on the type but those present about 1 mm. long, each subtended by a short, lanceolate bract; fruit glabrous, 3 mm. long and about 2 mm. wide, the ribs rather acute, much wider above than below, almost truncate above, the ribs rugulose.

This is nearest *B. gracillima,* from which it differs in the smaller size of the plant, less diffuse panicles, much smaller flowers, and the glabrous fruit of different form. Type in the herbarium of the New Mexico Agricultural College, collected in Filmore Canyon, Organ Mountains, New Mexico, October 23, 1904, *Wooton. B. gracillima* is common in the same locality.

20. **Boerhaavia gracillima** Heimerl, Bot. Jahrb. **11**: 86. 1889.

Boerhaavia anisophylla paniculata Coulter, Contr. Nat. Herb. **2**: 356. 1894.

Specimens examined:

MEXICO: Near Chihuahua, 1885, *Pringle* 665, type collection; Durango, 1896, *Palmer* 629; Sierra Madre, Chihuahua, *Townsend & Barber* 379; Ixmiquilpan, Hidalgo, 1905, *Purpus* 1436; San José del Cabo, Lower California, 1890, *Brandegee* 487; Mountains of Cosihuiriachi, 1846, *Wislizenus* 174.

NEW MEXICO: Organ Mountains, 1904, *Wooton;* same locality, 1897, *Wooton* 462, and several other collections.

TEXAS: El Paso, 1884, *Jones* 4215; canyon near Van Horn, 1900, *Eggert;* Chenate Mountains, 1889, *Nealley* 405, type of *B. anisophylla paniculata;* Presidio de Rio Grande, Mexican Boundary Survey 1135a.

20a. **Boerhaavia gracillima decalvata** Heimerl, subsp. nov.

Plant erect, branched; stems glabrous throughout; leaf blades oval or ovate, thick, glabrous, whitish beneath, obtuse, broadly rounded at the base; flowers single on pedicels 5 mm. long, 1 or 2 bractlets at the base of each flower but soon deciduous; flowers 9 mm. broad; fruit clavate, obtuse, with 5 rather thin ribs, glabrous.

This differs from the species in its glabrous fruit and larger flowers. Type U. S. National Herbarium no. 148477, collected at Bone Spring, western Texas, 1883, *Havard* 59.

21. **Boerhaavia anisophylla** Torr. Bot. Mex. Bound. 171. 1858.

Specimens examined:

———, Mexican Boundary Survey 1135, type collection.

TEXAS: Tornillo Creek, 1883, *Havard* 63, in part.

MEXICO: Santa Eulalia Mountains, Chihuahua, 1885, *Pringle* 685; Saltillo, Coahuila, 1898, *Palmer* 156; Mesillas to Saltillo, 1848, *Gregg* 533; west of Cerralvo, 1847, *Gregg* 829.

Doctor Heimerl[a] describes a new variety of this species, *B. anisophylla micrantha* from Mexico. I have seen nothing which answers to his description.

22. **Boerhaavia tenuifolia** A. Gray; Coulter, Contr. Nat. Herb. **2**: 355. 1804.

This is probably *B. linearifolia glabrata* A. Gray, Am. Journ. Sci. II. **15**: 322. 1853, but it is impossible to be certain, for the reason that no type was mentioned in the original description of that variety.

Specimens examined:

TEXAS: Camp Charlotte, 1889, *Nealley* 407, type ?; mouth of the Rio Pecos, 1883, *Havard* 64; near Alamo de Cesario, 1883, *Havard* 65.

NEW MEXICO: Thirty-five miles west of Roswell, 1900, *Earle* 379.

23. **Boerhaavia linearifolia** A. Gray, Am. Journ. Sci. II. **15**: 322. 1853.

I do not believe that the difference in size of flowers is a reliable means of distinguishing this from the preceding species; there does not seem to be any remarkable difference in size judging from type material of both species.

Specimens examined:

TEXAS: *Wright* 608, 1724, type collections; Kerrville, 1894, *Heller* 1849; Upper Llano, 1884, *Reverchon* 1357; Mexican Boundary Survey, 1132; Llano, 1899, *Bray* 334; Big Springs, 1902, *Tracy* 8074; Knickerbocker Ranch, Tom Green County, 1880, *Tweedy* 90.

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[a] Ann. Cons. et Jard. Genev. **5**: 187.

23a. **Boerhaavia linearifolia glandulosa** Standley, subsp. nov.

Perennial from a woody root; stems prostrate, branched, spreading, glandular-pubescent below, glandular above; leaves lanceolate, thin, green on both surfaces, black-dotted below, short-petioled; flowers larger than those of *B. lincarifolia* or *B. tenuifolia*, stamens 3.

Type in the herbarium of the Missouri Botanical Garden, collected in Texas by Lindheimer in 1846, no. 510, as well as several other numbers of various years' collections. Also collected in southwestern Texas by Reverchon (no. 126). This is the only form belonging to this group that I have seen with glandular hairs on the lower part of the stem; the plant, too, is larger and more robust than the species; it may be specifically distinct.

The writer has seen representatives of all of the North American species of Boerhaavia except the following:

BOERHAAVIA PALMERI S. Wats. Proc. Am. Acad. **24**: 69. 1889.
Type locality, "Dry sandy soil near Guaymas" (Mexico).
Collected 1887, *Palmer* 683.

BOERHAAVIA ALAMOSANA Rose, Contr. Nat. Herb. **1**: 110. 1891.
Type locality, "Hillside about Alamos" (Mexico).
Collected 1890, *Palmer* 714.

BOERHAAVIA SONORAE Rose, Contr. Nat. Herb. **1**: 110. 1891.
Type locality, "Along watercourses near Alamos."
Collected 1890, *Palmer* 715.

16. SELINOCARPUS A. Gray.

Selinocarpus A. Gray, Am. Journ. Sci. II. **15**: 262. 1853.

Perennial herbs or sometimes somewhat shrubby plants, ascending, erect, or prostrate; leaves opposite, often unequal, sessile or petioled, entire, thick and sometimes fleshy; flowers solitary in the axils of the leaves or clustered at the ends of the branches; bracts when present, small and inconspicuous; calyx funnelform, with a short and thick or long and slender tube which expands into a spreading limb; stamens 2 to 5, exserted; fruit with 3 to 5 prominent, membranous wings.

KEY TO THE SPECIES.

Flowers 10 mm. or less in length, with scarcely any tube.
  Leaves linear or very narrowly elliptical ..... 5. *S. angustifolius.*
  Leaves broadly ovate ..... 6. *S. chenopodioides.*
Flowers 15 mm. or more in length, with a conspicuous tube (the flowers sometimes cleistogamous).
  Leaves linear or very narrowly elliptical ..... 1. *S. palmeri.*
  Leaves neither linear nor very narrowly elliptical.
    Leaves lanceolate, very thick and fleshy ..... 2. *S. lanceolatus.*
    Leaves mostly ovate, not fleshy.
      Upper leaves mostly small and bract-like, scattered; stems much branched, 30 cm. or less in height ..... 3. *S. parvifolius.*
      Upper leaves not reduced; stems rather densely leafy, less branched, and lower. 4. *S. diffusus.*

1. **Selinocarpus lanceolatus** Wooton, Bull. Torr. Club **25**: 304. 1898.

Specimens examined:

NEW MEXICO: White Sands, 1897, *Wooton* 389, type; near El Rito, 1880, *Rusby* 357; White Sands, 1899, *Wooton;* near Suwanee, 1906, *Wooton.*

2. Selinocarpus palmeri Hemsl. Biol. Centr. Am. **3**: 6. 1882.

The leaves of this plant are much like those of *S. angustifolius*, but are covered with a close, appressed, whitish pubescence; young branches glabrous; flowers funnelform, the perianth about 15 mm. long and 11 mm. wide, gradually widening from the base upward; stamens much exserted; leaves on the young branches linear, thick, 25 mm. long.

Specimens examined:

MEXICO: San Lorenzo de Laguna, Coahuila, 1880, *Palmer* 1119.

3. Selinocarpus parvifolius (Torr.) Standley.

Selinocarpus diffusus parvifolius Torr. Bot. Mex. Bound. 168. 1858.

Specimens examined:

TEXAS: Presidio del Norte, Mexican Boundary Survey 1105, type collection; Presidio, 1881, *Havard;* Bone Spring, and Tornillo Creek, 1883, *Havard.*

4. Selinocarpus diffusus A. Gray, Am. Journ. Sci. II. **15**: 262. 1853.

Specimens examined:

TEXAS: Rock hills from the Pecos to the Limpio, *Wright* 1708, type collection; 5 miles east of Estelline, 1904, *Reverchon* 4283; Estelline, 1903, *Reverchon* 3685; Big Springs, 1902, *Tracy* 8313.

NEW MEXICO: Delaware Creek, 1893, *Nealley* 10; south of Carrizozo, 1904, *Wooton* 2821; Acoma, 1884, *Lemmon.*

The flowers of this species are often cleistogamous, but on specimens of the species proper fully developed flowers can almost always be found.

4a. Selinocarpus diffusus nevadensis Standley, subsp. nov.

Leaves ovate, 15 to 18 mm. long and about 13 mm. wide, broadly obtuse, often mucronate, rounded or truncate at the base, their margins entire and smooth, the blades thickish, puberulent or often glabrous above; flowers all cleistogamous.

This form differs from the species in its broader and more obtuse leaves with entire margins; the leaves are also a bright yellowish-green in color; the flowers seem to be always precociously fertilized. The plant is readily distinguished by its general appearance and is probably a good species, but the differences are difficult of definition.

Type U. S. National Herbarium no. 23012, collected at Overton, Lincoln County, Nevada, 1891, *Vernon Bailey* 1932.

Other specimens examined:

NEVADA: Muddy Valley, 1906, *Kennedy & Goodding* 5; Moapa, 1905, *Kennedy* 1085.

UTAH: Southern Utah, 1876, *G. E. Johnson;* southern Utah, 1877, *Palmer* 402; southern Utah, 1874, *Parry* 213.

5. Selinocarpus angustifolius Torr. Bot. Mex. Bound. 170. 1858.

Specimens examined:

TEXAS: Mexican Boundary Survey 1129, type collection; Chenate Mountains, 1899, *Nealley* 457.

MEXICO: Viesca, Coahuila, 1905, *Purpus* 1054; Mesillas near Saltillo, 1848, *Gregg* 535.

6. Selinocarpus chenopodioides A. Gray, Am. Journ. Sci. II. **15**: 262. 1853.

Specimens examined:

TEXAS: Gravelly hills, El Paso, etc., *Wright* 1707, type collection; El Paso, 1881, *Vasey;* El Paso, 1885, *Pringle;* El Paso, 1884, *Jones* 4214; Chenate Mountains, 1889, *Nealley* 458; J. Davis's Ranch, 1883, *Havard.*

NEW MEXICO: Socorro, 1881, *Vasey;* Boundary Monument 6 to Monument 12, 1892, *F. Wagner* 960; near Belen, 1880, *Rusby* 356; Mesilla Valley, 1906, *Standley;* plains south of the White Sands, 1897, *Wooton* 408; Tortugas Mountain, 1902, *Wooton;* Albuquerque, 1894, *Herrick;* Organ Mountains, 1902, *Wooton;* Rio Grande 40 miles above Rincon, 1904, *Metcalfe.*

ARIZONA: Apache Pass, Chiracahua Mountains, 1881, *Lemmon;* near Duncan, 1900, *A. Davidson.*

MEXICO: Plains near Chihuahua, 1885, *Pringle* 652; Ciudad Juarez, 1902, *Pringle* 11143.

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SMITHSONIAN INSTITUTION

UNITED STATES NATIONAL MUSEUM

CONTRIBUTIONS

FROM THE

UNITED STATES NATIONAL HERBARIUM

VOLUME XII, PART 9

MISCELLANEOUS PAPERS

By J. N. ROSE, N. L. BRITTON, and
WILLIAM R. MAXON

WASHINGTON
GOVERNMENT PRINTING OFFICE
1909

BULLETIN OF THE UNITED STATES NATIONAL MUSEUM.

ISSUED MAY 10, 1909.

PREFACE.

The following number of the Contributions contains 11 short papers upon new or noteworthy plants. Of these the first 10, one by N. L. Britton and J. N. Rose, the others by J. N. Rose, relate to North American plants, chiefly Cactaceae and Crassulaceae from desert regions. The last paper, by William R. Maxon, contains the description of a new fern from China. This species was found in the Henry collection of Chinese plants, a set of which is in the National Herbarium.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

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THOMPSONELLA, A NEW GENUS OF CRASSULACEAE FROM MEXICO.

By N. L. Britton and J. N. Rose.

In 1905 *Echeveria minutiflora* first bloomed in cultivation. It flowered in the Missouri Botanical Garden, the New York Botanical Garden, and one of the greenhouses of the Department of Agriculture in Washington at the same time. It was studied independently by the writers and Mr. C. H. Thompson, and all reached the conclusion that it represented a distinct generic type. Material has repeatedly flowered since that time, and now we feel justified in proposing this new genus, named in honor of Charles Henry Thompson of the Missouri Botanical Garden.

In 1907 Mr. C. G. Pringle collected a second species, which flowered in the spring of 1908. This is described below.

Mr. Thompson has had under observation for several years two very distinct species, one of which is probably *T. minutiflora* and the other an undescribed species. It seems best not to describe this species at present, but to wait until further field work has been done. Several years ago a plant bloomed in Washington which seemed to suggest a fourth species, but as there is some doubt as to place of collection it seems best to delay the publication of this also. The genus with two species is described as follows:

Thompsonella Britton & Rose.

Acaulescent; basal leaves few, spreading, thick, oblong; inflorescence a loose simple spike or in large specimens more or less compound; sepals 5, turgid, erect, clavate; corolla somewhat angled in the bud, rotate, the tube proper very short, the lobes lanceolate, spreading horizontally or somewhat deflexed between the sepals; stamens 10, erect, about as long as the petals; carpels erect, constricted at base; styles slender; scales minute.

Type species *Echeveria minutiflora* Rose.

The inflorescence is very unlike any other in this family which we have yet studied. The flowers are arranged in spirals of three and are not strictly axillary, but stand, though directly over, at some distance above the subtending bract; they are very unlike those of all the true Echeverias in having a strictly rotate corolla and thinner petals.

Thompsonella minutiflora (Rose) Britton & Rose. PLATE XLIV.

Echeveria minutiflora Rose, Bull. N. Y. Bot. Gard. 3: 9. 1903.

Flowering stems glaucous, clothed with thick but reduced leaves; basal leaves acute or obtuse, often strikingly purplish, glaucous; inflorescence either a simple equilateral spike or a very narrow panicle; sepals acute, distinct, narrow, thickened and nearly terete above; corolla segments a little longer than the sepals, red tinged with green, troughed above.

Distribution Puebla and Oaxaca.

Redescribed from specimens flowering in the greenhouses of Washington and New York, October, 1905.

EXPLANATION OF PLATE XLIV.—Fig. *a*, plant; *b*, cross section of basal leaf; *c*, cross section of stem leaf; *d*, cross section of sepal; *e*, flower; *f*, carpels; *g*, petals and stamens. Figs. *a* to *d*, natural size; *e* to *g*, scale 3.

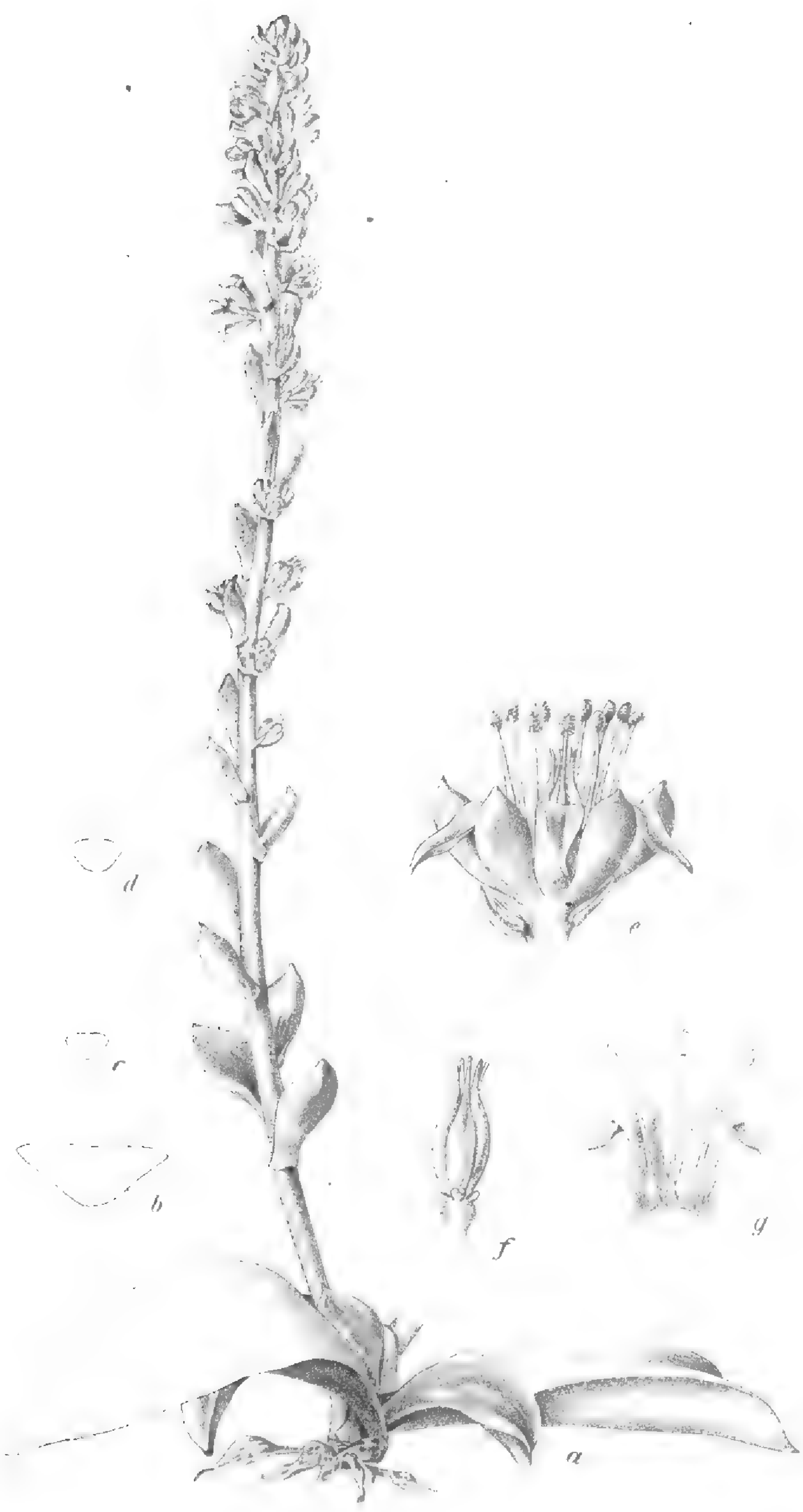
Thompsonella platyphylla Rose, sp. nov. PLATE XLV.

Basal leaves oblanceolate, 8 to 12 cm. long, 3 to 4 cm. broad, narrowed at base into a broad, thick petiole, acute when young, glaucous and with purple margins, in age obtusish and green; flowering stem 20 cm. long, glaucous, naked below, bearing 3 small leaves below the inflorescence; inflorescence a narrow panicle; sepals glaucous, thick, almost terete, distinctly united at base; petals longer than the sepals, 6 mm. long, acute.

Collected by C. G. Pringle in Iguala Cañon, Guerrero, Mexico, in July, 1907, and described from specimens which flowered in Washington early in 1908.

Type U. S. National Herbarium no. 574982.

EXPLANATION OF PLATE XLV.—A potted plant. Scale about ½.



THOMPSONELLA MINUTIFLORA (ROSE) BRITTON & ROSE.

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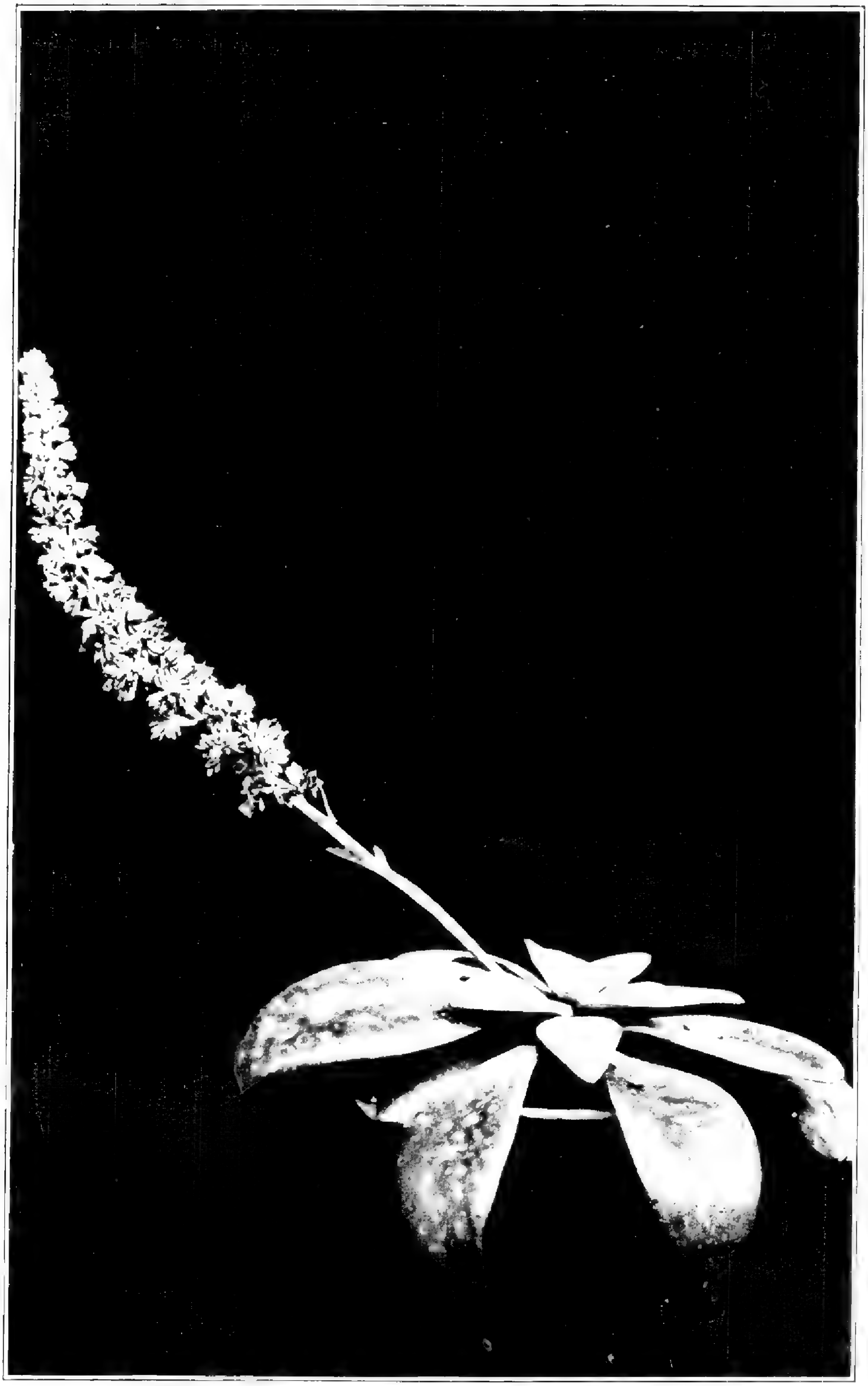
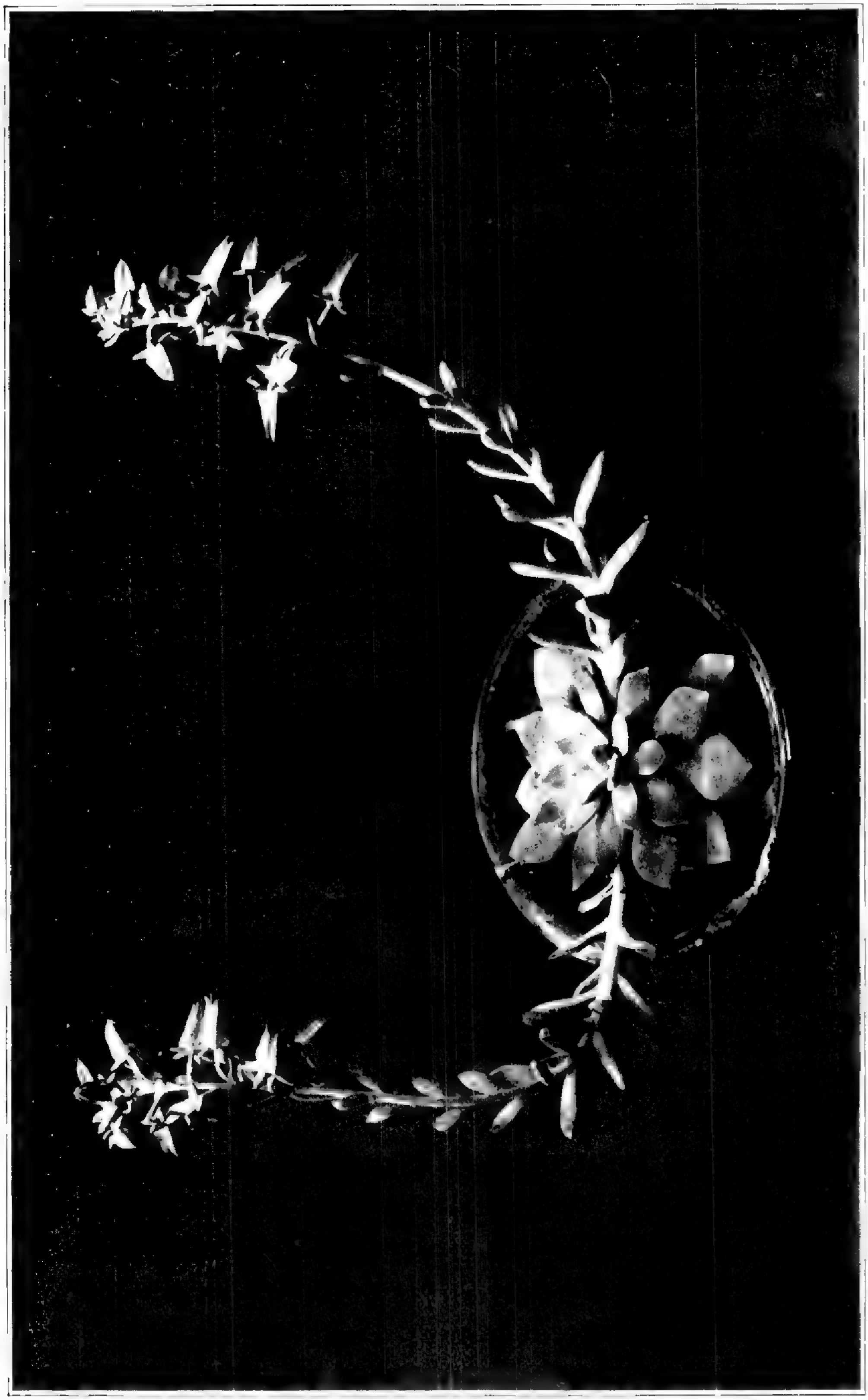


THOMPSONELLA PLATYPHYLLA ROSE.



ECHEVERIA CARNICOLOR BAKER.

REDISCOVERY OF ECHEVERIA CARNICOLOR.

By J. N. Rose.

When Britton and Rose published their revision of the Crassulaceae[a] they recognized 58 species of Echeveria. Most of these they described from living material. It is probable that no one had ever before had so full a representation of this genus, since only 4 known species were wanting from their collections, viz, *E. canaliculata* Hook., *E. carnicolor* Baker, *E. bifida* Lindl., and *E. teretifolia* DC. It is a great gratification now to be able to announce the rediscovery of one of these.

In October, 1906, Dr. C. A. Purpus, the well-known Mexican collector, sent to the National Museum an Echeveria from the Barranca de Tenampa, in the State of Vera Cruz. The three specimens sent were at once planted, but did not flower until January, 1908, when they were found to be *E. carnicolor*. This species has heretofore been known only from the specimens in the conservatory of the late W. W. Saunders, upon the basis of which it was described and figured by Dr. J. G. Baker, in 1870, in Saunders's Refugium Botanicum.[b] As stated by Doctor Baker, this species is nearest *E. lurida*, but it is a much smaller plant with weaker flower stems and fewer flowers. The leaves have a decided bluish tinge with hints of pink, and, especially when young, have a decided metallic sparkle, perhaps caused by the papilla-like plates which cover their surfaces. The flowers are sometimes more numerous than in the plant figured by Doctor Baker, and the inflorescence is often compound. The plant is easily propagated, since the small leaves of the flowering stems readily fall off, soon rooting and forming new plants. In some respects it is a more attractive plant than *Echeveria lurida*, and it may prove a useful plant for formal bedding.

The accompanying illustration will give a good idea of the habit of a plant in flower. A description of this species follows:

Echeveria carnicolor Baker. PLATE XLVI.

Leaves 20 or more, forming a dense rosette, thickish but flattened, oblanceolate-spatulate, 3 to 4 cm. long, acute, with a bluish metallic luster; flowering stems 2 or 3, at first spreading, the upper part ascending or erect, very leafy below; flowers 6 to 15; sepals ovate to lanceolate, spreading; corolla orange-red, 12 mm. long.

EXPLANATION OF PLATE XLVI.—A potted plant. Scale about ½.

[a] N. A. Flora, Vol. XXII, Pt. 7, pp. 7–74.

[b] 3: *pl. 199.* 1870.

ECHEVERIA GUATEMALENSIS ROSE.

ECHEVERIA MAXONII ROSE.

THREE NEW SPECIES OF CRASSULACEAE FROM GUATEMALA.

By J. N. Rose.

In 1906 Mr. William R. Maxon was sent to Guatemala by the United States Department of Agriculture. At my request he collected and sent to Washington living and herbarium specimens of all the Crassulaceae he could find. Three of these proved to be undescribed. They have all flowered here in Washington, and small plants are available for distribution. One of the illustrations here used was made from a photograph taken in Guatemala, while the other was taken from a potted plant in Washington.

Echeveria guatemalensis Rose, sp. nov. PLATE XLVII.

Stems branching especially at base, resembling somewhat both in habit and foliage *Sedum prealtum*, 10 to 15 cm. high; leaves equally distributed on the stem, alternate, spreading nearly at right angles to the stem, fleshy but flattened and thinner than in most species of this genus, 2 to 4 cm. long, 2 cm. or less broad, spatulate, with a flat surface above, rounded at apex but with a decided mucro, rounded below into a broad petiole, pale green, slightly glaucous, the margins sometimes tinged reddish; flowering branch 20 to 30 cm. long, from the axil of a leaf near the middle of the stem, reddish, bearing numerous reddish leaves; inflorescence an equilateral raceme bearing 20 or more flowers; pedicels 3 to 4 mm. long; sepals linear, acute, spreading nearly at right angles to the pedicels; corolla buds broadly ovoid, acute, the corolla when open 10 mm. long and broad in proportion, pinkish below, yellowish above, the lobes acute; stamens 10, shorter than the corolla.

Collected by Mr. William R. Maxon, on Volcan de Agua, at an altitude of 2,700 to 3,000 meters, Guatemala, March 22, 1905 (no. 3726) and flowered in Washington, May, 1907.

U. S. National Herbarium no. 399713.

EXPLANATION OF PLATE XLVII.—A potted plant. Scale about $\frac{1}{3}$.

Echeveria maxonii Rose, sp. nov. PLATE XLVIII.

Stems glabrous, frutescent, at first erect, becoming decumbent, 60 to 80 cm. long, naked below, very leafy near tips; leaves on young or slowly growing plants massed near the top but in vigorous shoots rather distant, standing at right angles to the stem, 3 to 10 cm. long, spatulate, narrowed at base into a more or less definite petiole, rounded below, decidedly trowel-shaped above,

obtuse or acutish, green on the under surface, not at all glaucous, the margins more or less purplish; inflorescence an equilateral raceme or sometimes becoming a narrow panicle; peduncle elongated, 20 to 30 cm. long, leafy (in our herbarium specimens often naked); sepals distinct, semiterete, acute, glaucous, unequal, spreading with age; petals distinct nearly to the base, erect except the tips, these spreading, salmon-pink in color; stamens 10; scales white.

Collected by William R. Maxon, at Chuacús, between Salama and Las Canoas, January 22, 1905 (no. 3406, type), and at Zunil, Department of Quezaltenango, Guatemala, February 24, 1905 (no. 3605). Ample living material of the first number was sent to Washington and has been used in drawing up this description. These plants grew in the pockets of nearly solid rocky slopes, falling down over the surface, as shown in the accompanying illustration. Here they were fully exposed to the sun and were surrounded by starved shrubs and grasses and a species of Mamillaria.

This species must be near *E. australis*, but it has different foliage and flowers.

Type U. S. National Herbarium no. 473390.

EXPLANATION OF PLATE XLVIII.—Plant in its natural habitat. From a photograph taken by Mr. Maxon.

Villadia guatemalensis Rose, sp. nov.

Very much branched, spreading, generally procumbent, the flowering branches erect or ascending; leaves closely set, standing nearly at right angles to the stem, pale yellowish green, terete, 1.5 to 2 cm. long, pointed; flowers few, the first terminal, the others from the axils of the leaves, all sessile; sepals ovate, green, nearly distinct; corolla lemon-yellow, its tube short but definite, its lobes spreading; styles slender; carpels erect even in age.

Collected by William R. Maxon near Chuacús, between Salama and Las Canoas, Guatemala, January 22, 1905 (no. 3411), and flowered in Washington, January, 1906.

Type U. S. National Herbarium no. 473398.

REDISCOVERY OF CEREUS NUDIFLORUS.

By J. N. Rose.

About 1854 Charles Wright collected in Cuba a tree cactus which Dr. George Engelmann described in 1869 as *Cereus nudiflorus*. Since its publication, so far as I can learn, this species has not until recently been re-collected, and has received very little further notice. Engelmann himself published nothing additional upon it, and the name fails to appear at all in the index to his "Botanical Works." The name is also entirely overlooked by the "Kew Index." Schumann, in his "Monograph of the Cactaceae," merely refers the species to *Cereus lepidotus*. Material lately collected, however, places the species in full light and vindicates its claims to independent standing. In the spring of 1907 Mr. William R. Maxon was detailed by the U. S. National Museum to carry on botanical explorations in eastern Cuba, with verbal instructions to pay especial attention to the Cactaceae. This work was carried on with much enthusiasm and thoroughness, and one of the results was the collection of a fine series of specimens of *Cereus nudiflorus*. A number of cuttings were sent to Washington, but these unfortunately rotted during shipment.

Flowers were preserved in alcohol, however, good herbarium specimens were obtained, and arrangements were made for obtaining additional material and photographs. Soon after Mr. Maxon's return Mr. Theodore Brooks, of Guantanamo, sent him a photograph of an old tree taken in the winter of 1888–1889 near Novaliches not far from Caños. Unfortunately this photograph is too much faded to admit of reproduction. It is of interest as showing not only the tree, which is a very large one, but the figure of Baron Eggers standing near it. The species is thus shown to have been known to Baron Eggers, but whether or not he actually collected specimens I do not know. Again in August, 1906, Mr. Brooks sent two negatives and two prints of a tree 8 meters high, in fruit, found at Los Caños. One of the prints is here reproduced. He also sent, in sections, two mature fruits, one of which has been reconstructed and photographed for reproduction here. This seems to be the first time the fruit has ever been preserved

in a scientific collection. Mr. Brooks also promised to send seed later. Besides Mr. Brooks's contributions Mr. Maxon received from Mr. Jennings S. Cox, of Santiago de Cuba, in July, 1907, 4 photographs representing different views of a tree of this species, one of which is here reproduced.

Cereus nudiflorus Engelm. in Sauvalle, Anales Acad. Cienc. Habana **6**: 98. 1869.[a] PLATES XLIX, L, LI.

A large tree, often 7 meters high, much branched; trunk long-cylindrical with a solid wood core; young branches weak, strongly 3 or 4-winged or angled, with a very slender woody axis and made up of numerous short joints; ribs or wings very thin, 4 to 5 cm. deep, the margin strongly undulate, with the areoles 5 to 6 cm. apart; areoles large, with very short wool, at first spineless, later developing one or two spines (these sometimes 4 cm. long, slender, but stiff) or in very old areoles 10 or more; ovary and tube of flower cylindric, about 10 cm. long, 2 cm. in diameter, the fleshy walls tough and firm, bearing few or no bracts, glabrous and spineless; petals small, perhaps not more than 4 cm. long, white; stamens numerous, borne at the top of the corolla tube; style thick and fleshy; fruit smooth, greenish, globular or a little longer than broad, 8 to 10 cm. long, with a very thick, tough rind (10 to 15 mm. thick); seeds 3 mm. long, brownish, roughened, truncate at base.

Described from specimens collected by Wm. R. Maxon in eastern Cuba in 1907, with notes furnished by Mr. Maxon, and from fruit sent by Theodore Brooks in 1908 from the same region.

EXPLANATION OF PLATES XLIX, L, LI.—Plate XLIX, view of tree. From a photograph sent by Mr. Cox of a specimen which grew at Daiquiri, east of Santiago de Cuba. Plate L, view of tree. From one of the photographs furnished by Mr. Brooks of a specimen at Los Caños. Plate LI, two fruits sent by Mr. Brooks, one of them in sections. Natural size.

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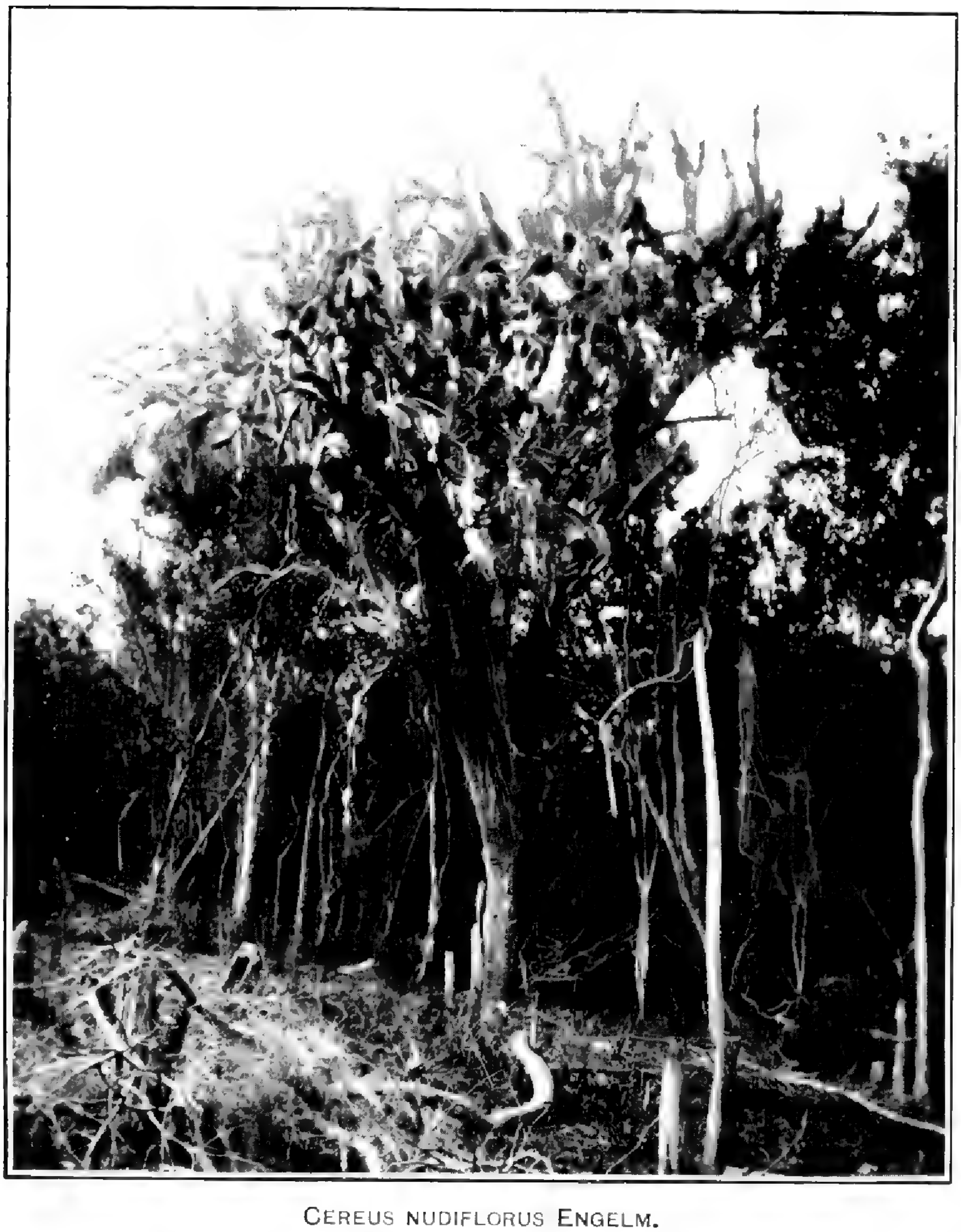
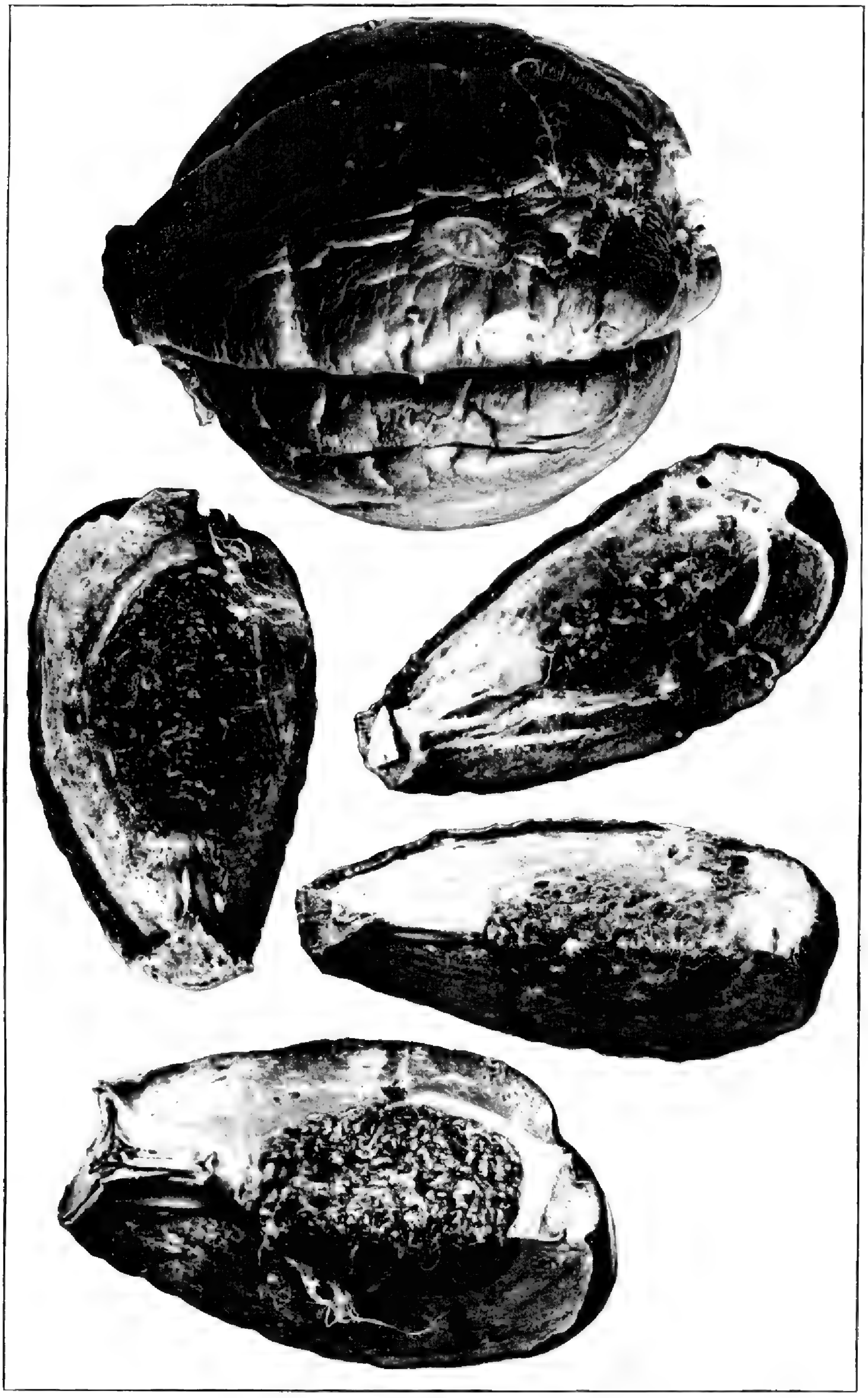
[a] The parts of Sauvalle's work, issued serially, were collected in 1873 as Flora Cubana. See Hitchcock, Contr. Nat. Herb. **12**: 184. 1908.



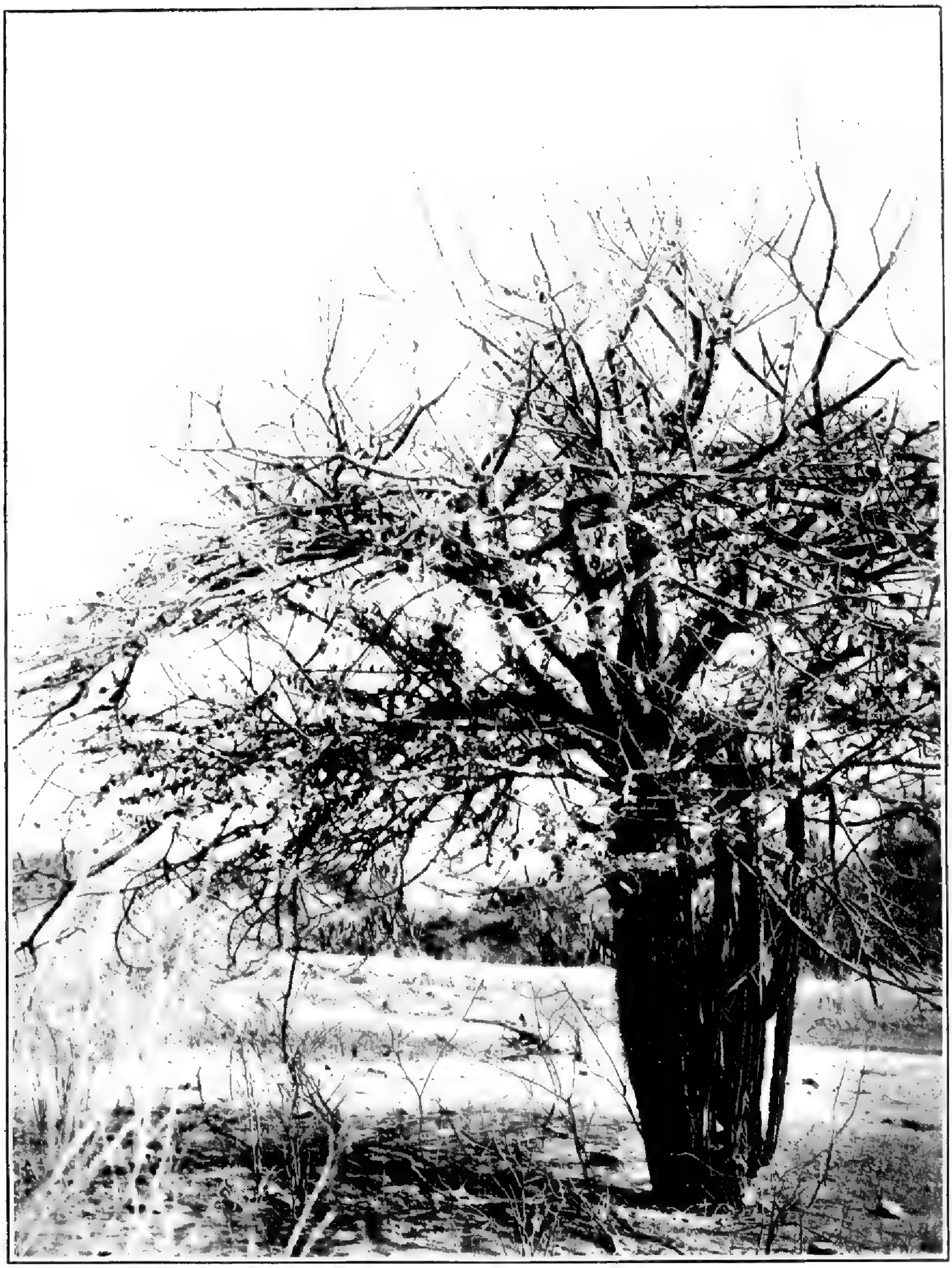
CEREUS NUDIFLORUS ENGELM.

CEREUS NUDIFLORUS ENGELM.

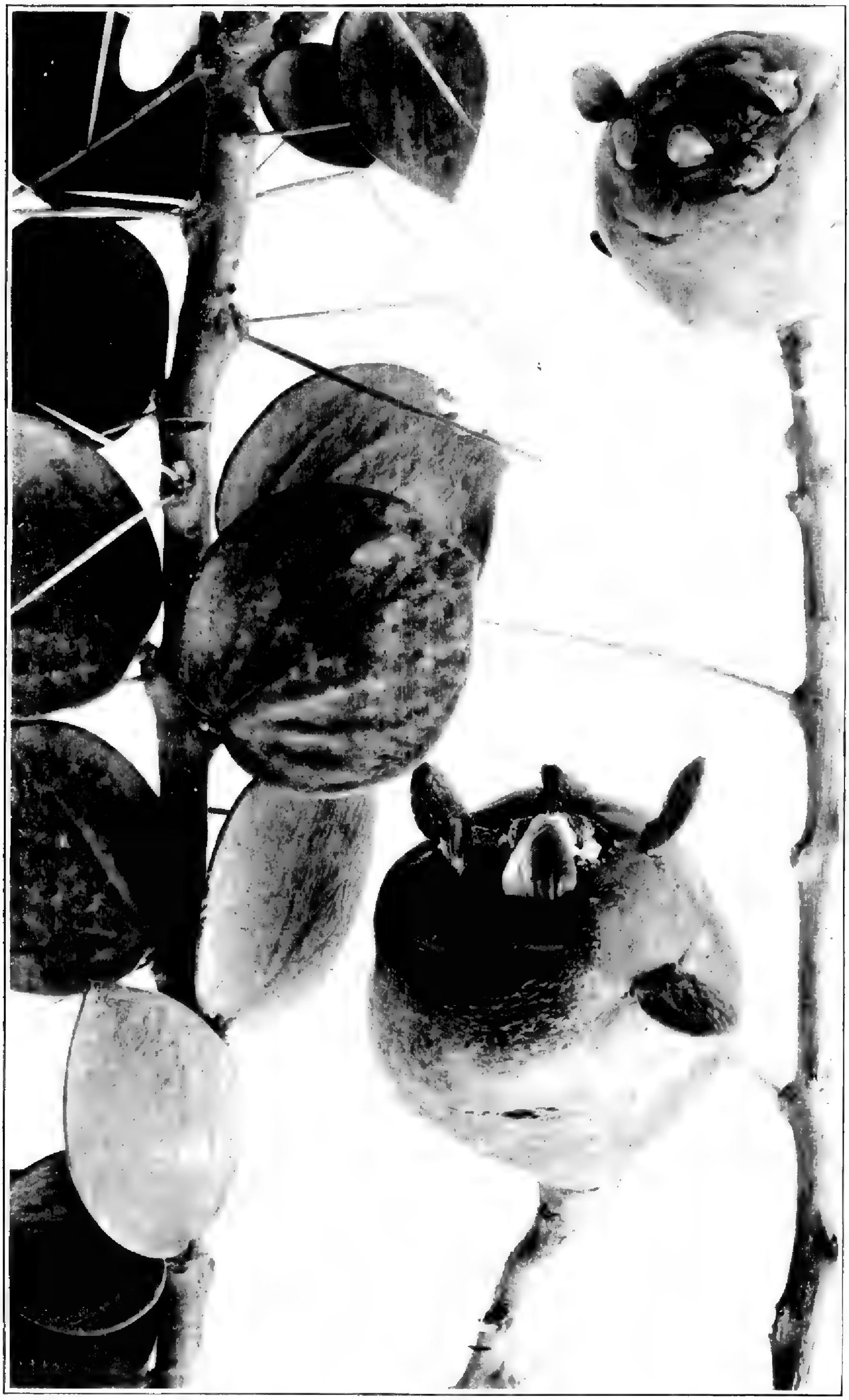


FRUIT OF CEREUS NUDIFLORUS ENGELM.

PERESKIA AUTUMNALIS (EICHLAM) ROSE.



PERESKIA AUTUMNALIS (EICHLAM) ROSE.



FRUITING BRANCHES OF PERESKIA AUTUMNALIS (EICHLAM) ROSE.

A SPECIES OF PERESKIA FROM GUATEMALA.

By J. N. Rose.

Since 1902 I have had knowledge of a most remarkable species of Pereskia in Guatemala. My attention was first called to it by Dr. O. F. Cook, who collected specimens and, with Mr. G. N. Collins, obtained several excellent photographs. Soon after that time, and again in 1906, as also in 1907, Prof. W. A. Kellerman obtained photographs and some excellent specimens. This last material, received soon after the death of Professor Kellerman, has led me to re-examine all the material at hand and to describe it as new. It has been suggested that there may be more than one species in Guatemala, but while my material shows considerable variation this is not such that I feel warranted in dividing it. This Guatemalan species has sometimes been called *P. nicoyana*, but it differs from that species in habit, the petals are not fringed, and the axils of the leaves are not hairy.[a]

Pereskia autumnalis (Eichlam) Rose. PLATES LII, LIII, LIV.

Pereskiopsis autumnalis Eichlam, Monatsch. Kakteenk, **19**: 22, 1909.

Tree 6 to 9 meters high, with a large, rounded, much branched top, the trunk usually very definite and 40 cm. or more in diameter; young branches cherry-brown, smooth; axillary spines usually very slender, generally single, sometimes in threes, 3 to 4 cm., rarely 8 cm. long; leaves thickish, oblong to orbicular, 4 to 8 cm. long by 3 to 4 cm. broad, round or somewhat narrowed at base, mucronate-tipped; flowers sessile or nearly so; ovary bearing ovate leafy bracts; sepals ovate, acute, naked in the axils; petals entire, perhaps about 1 cm. long, red; fruit globular, 4 to 5 cm. in diameter, fleshy, glabrous, bearing scattered leafy bracts, these naked in the axils; seeds black, glossy, 4 mm. long.

The following herbarium material has been examined:

From El Rancho, W. A. Kellerman, December 28, 1908, nos. 7011 and 7014; also from the same locality, O. F. Cook, April 9, 1902.

In addition to this I have examined various bottled specimens and a fine series of 9 photographs, a part of which are here reproduced.

EXPLANATION OF PLATES LII, LIII, LIV.—Plates LII, LIII, two trees, showing habit. From photographs by W. A. Kellerman. Plate LIV, fruit and leaves. Natural size.

[a]After this paper had gone to the printer I learned from Mr. Eichlam, of Guatemala City, that he was about to publish a new species of Pereskiopsis. His paper is now at hand and contains a very full and interesting account of his species. A careful reading of the description of *Pereskiopsis autumnalis* convinces me that his species is the same as the one I had proposed to publish here as new. I have therefore substituted his specific name in place of the one I had in proof. I can not agree with him, however, that it belóngs to Pereskiopsis. The fruit and seeds are very different from those of that genus. The seeds of this species, as described above, accord with Pereskia while those of true Pereskiopsis approach those of Opuntia.

NEW SPECIES OF OPUNTIA FROM ARIZONA.

By J. N. Rose.

During a part of April and May of 1908 I was located at Tucson, Arizona, the guest of the director of the Desert Laboratory of the Carnegie Institution. While there I frequently visited Tumamoc Hill, upon which the laboratory is built. Upon this hill was found a profusion of the prickly pears or flat-jointed Opuntias. A careful examination of these plants led me to believe that there were among them at least four well-defined species. Further study in the Catalina Mountains, Tucson Mountains, Tortolitas Mountains about Tucson, and the Whetstone Mountains about Benson, convinced me that these were not mere mutations but well-established species extending over large areas of southeastern Arizona. After reaching the conclusion that there were four species on Tumamoc Hill, I went over the material with Dr. D. T. MacDougal, Prof. J. J. Thornber, and Mr. J. C. Blumer, all of whom agreed with me in my conclusion. Since returning to Washington I find that Prof. J. W. Toumey has collected three of the species, considering them distinct. One of these he has called *O. lindheimeri*, but this was at a time when *O. lindheimeri* was supposed to be a very polymorphic species and to extend from eastern Texas to the Pacific Ocean. *O. lindheimeri* is now known to be a pretty uniform species with a much more limited range. *O. engelmanni*, which has also passed as *O. lindheimeri*, has been rediscovered at the type locality and found to be, not only very different from *O. lindheimeri*, but very unlike any of our Arizona species. Another of the three Professor Toumey called *O. phaeacantha*, but an examination of the type sheet of that species, now in the Missouri Botanical Garden herbarium, shows that this reference also is a misidentification, and I have named the plant *O. blakeana*.

It was my original expectation to publish all four of these species as new, but long after this paper had been prepared and just as it was going to press I discovered that one of the species had been described by Dr. David Griffiths as *O. discata*.[a]

[a] Rep. Mo. Bot. Gard. **19**: 266. 1908.

Opuntia arizonica Griffiths, Rep. Mo. Bot. Gard. **20**: 93. 1909.[a]

Plants stout, more or less spreading, but in time becoming 1 to 1.5 meters high, forming broad clumps; old joints very large and thick; last year's joints orbicular, often rounded at base, 15 to 25 cm. in diameter, pale glaucous green; spines 2 to 5, generally 4 or 5, usually 4 to 6 cm. long, more or less spreading in all directions, stout and somewhat flattened, bright red at base, above whitish or tinged with rose; areoles often 4 to 6 cm. apart; lower areoles naked or with a single spine; bristles caducous except along the margins of the joints, here numerous and long; flowers large, nearly 40 cm. broad, at first lemon-yellow, hardly at all tinged with red at base, in age becoming salmon-colored; ovary somewhat elongated, slightly glaucous, 3.5 to 4 cm. long.

Collected by J. N. Rose near Desert Laboratory, Tucson, Arizona, April, 1908 (no. 11751).

Common on foothills and low mountains in the general region of Tucson.

This species was frequently collected by Professor Toumey under the name of both *O. engelmanni* and *O. lindheimeri*.

Opuntia toumeyi Rose, sp. nov.

Plants low, widely spreading or prostrate; last year's joints obovate, 15 to 20 cm. long, dull green, slightly glaucous; spines 1 to 4, generally 1 or 2, one usually very long and porrect, 4 to 6 cm. long, terete, light brown, the shorter spines often white and appressed; lower areoles naked; young joints pale green, slightly glaucous, the young areoles crowning small tubercles; leaves 6 to 8 mm. long, somewhat bronzed, acute; young areoles with a single rose-colored spine; bristles usually brownish; petals 3 cm. long, deep yellow, reddish, or bronzed at base; ovary oblong, 5 cm. long, glaucous, with oblong tubercles crowned by the areoles, these with brown bristles, but no spines.

Type collected by J. N. Rose near Desert Laboratory, Tucson, Arizona, April, 1908 (no. 11750).

Type U. S. National Herbarium no. 454445.

Opuntia blakeana Rose, sp. nov. PLATE LV.

Plants low and widely spreading, the old branches trailing on the ground, rarely rising more than 40 to 60 cm. above the ground; joints obovate, small, 1 to 1.5 cm. long, thick, pale, more or less purplish about the areole; spines usually only 2 or 3 at each areole (the lower areoles often without any), short brownish; flowers yellow, more or less reddish in the center.

Type collected by J. N. Rose near Desert Laboratory, Tucson, Arizona, April, 1908 (no. 11753).

Distribution southern Arizona.

Type U. S. National Herbarium no. 454451.

This species is named for Dr. W. P. Blake, of Tucson, Arizona.

EXPLANATION OF PLATE LV.—A pad. Natural size.

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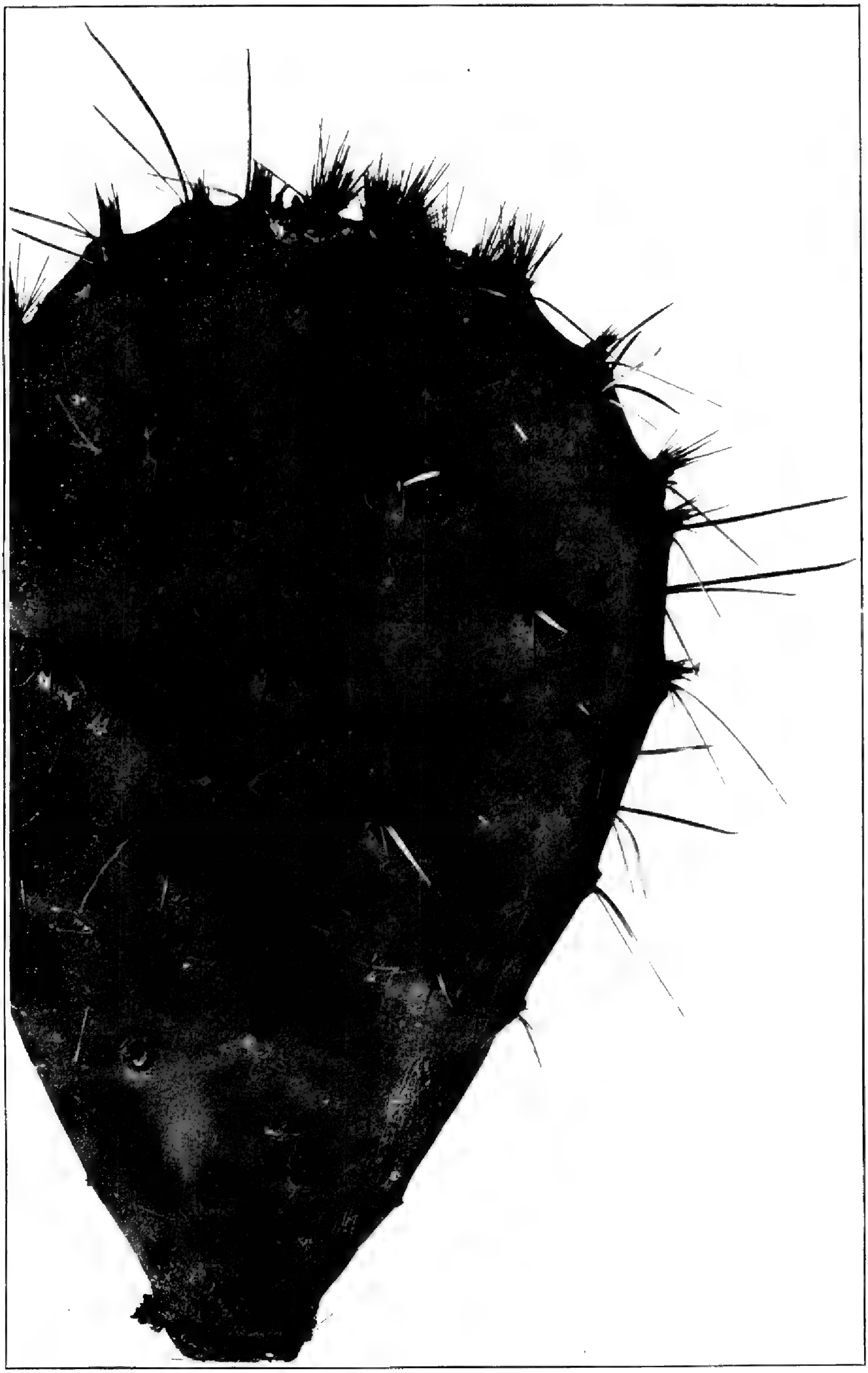
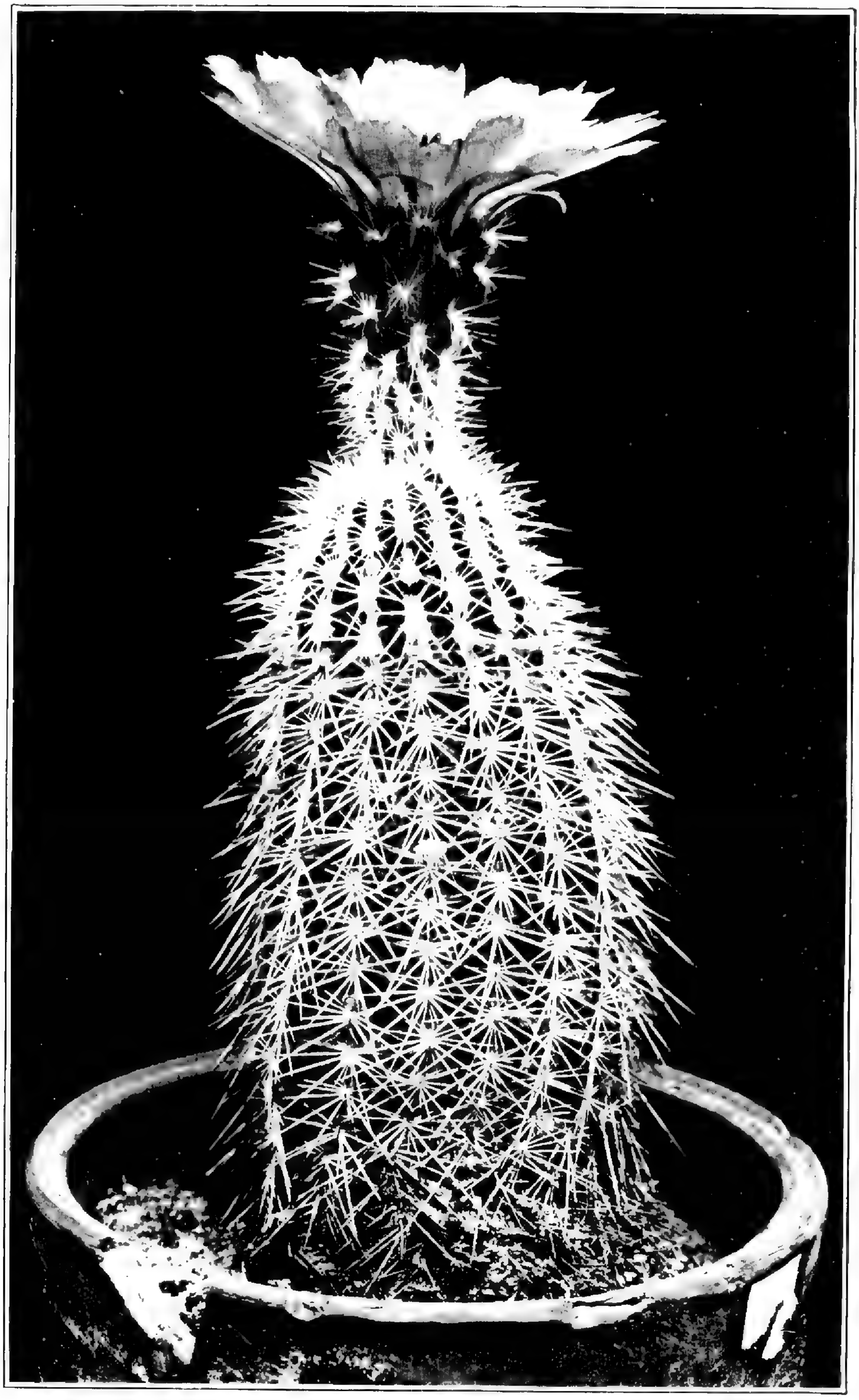
[a] Still later, while the page proof of this paper was in hand, Dr. Griffiths's publication of *O. arizonica* was received, which proved to be an anticipation of another of my species. I accordingly here substitute Dr. Griffiths's name, allowing, however, my description to stand as already in type.



A JOINT OF OPUNTIA BLAKEANA ROSE.



ECHINOCEREUS BAILEYI ROSE.

FLOWER OF ECHINOCEREUS BAILEYI ROSE.

ECHINOCEREUS BAILEYI, A NEW CACTUS FROM OKLAHOMA.

By J. N. Rose.

In 1904, James H. Gaut while collecting in the Wichita Mountains for the Biological Survey of the Department of Agriculture sent me two specimens of an Echinocereus, which at first I supposed to be a peculiar form of *Echinocereus caespitosus*. Further examination of these plants showed very marked difference in the habit and in the arrangement of spines. Both these plants died without flowering. In 1906 Mr. Vernon Bailey also obtained from the Wichita Mountains several specimens, one of which flowered in 1907.

The species may be described as follows:

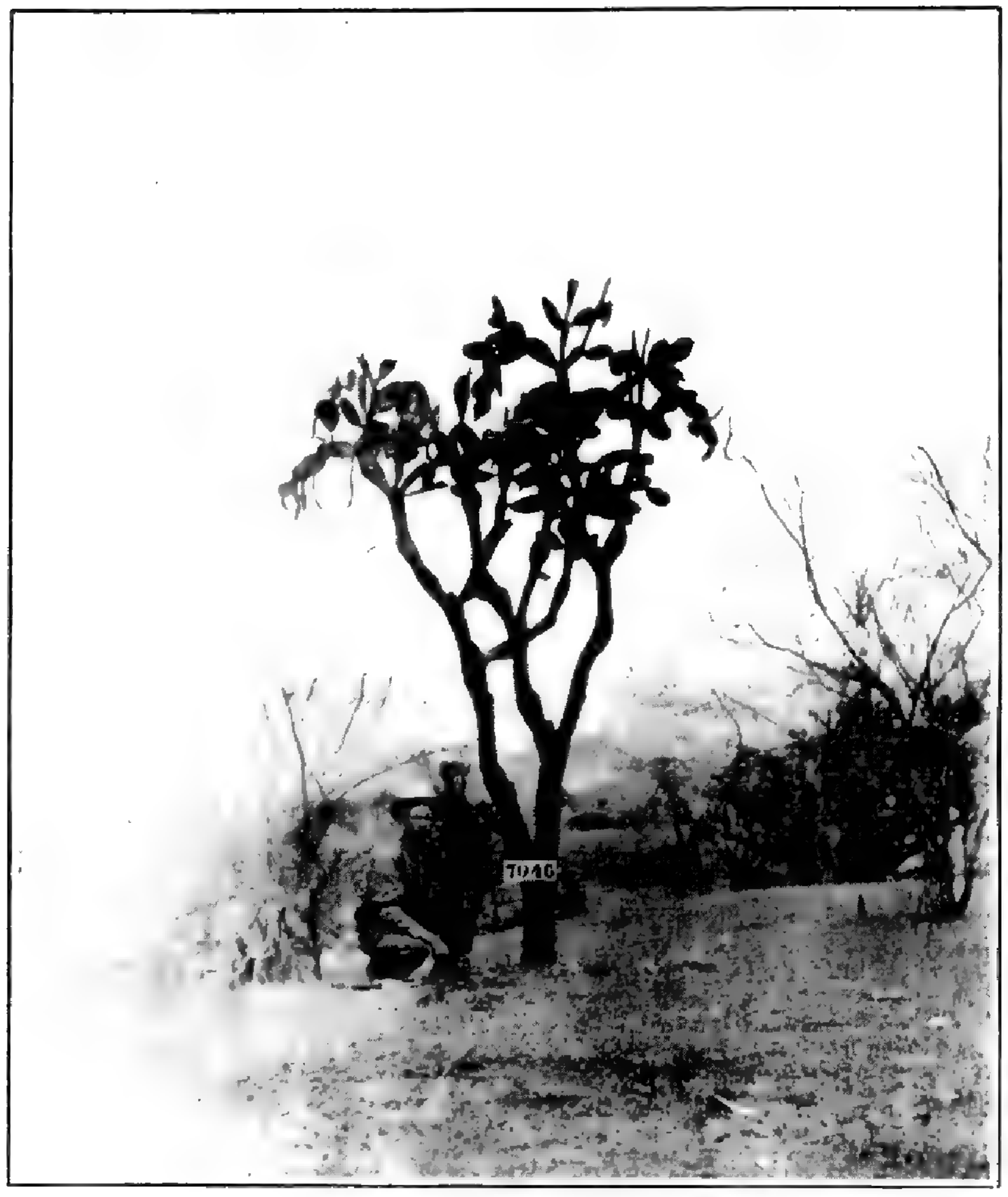
Echinocereus baileyi Rose, sp. nov. PLATES LVI, LVII.

Plant body cylindrical, 10 cm. or so high; ribs 15, straight or perhaps sometimes spiral; areoles elongated, separated from the adjacent ones by a space of about their own length; spines at first white, when mature brownish or yellowish, about 16, somewhat spreading, those at the top and base of the areole smaller; central spines none; areoles when young clothed with dense white wool, this nearly or quite wanting in age; flowers from the youngest growth appearing terminal; corolla widely spreading, 6 cm. or more broad; petals light purple, oblong to spatulate-oblong, the broad apex toothed or jagged, the terminal tooth tapering into a slender awn; filaments short, yellow; style stout, longer than the filaments; stigmas 10, obtuse, green; areoles of the ovary bearing 10 or 12 slender spines intermixed with cobwebby wool, the spines whitish, or the central ones brownish; areoles of the tube crowning an elongated tubercle, not so closely set, bearing spines subtended by minute leaves.

Collected by James H. Gaut, Mount Scott, Wichita Mountains, Oklahoma, October 25, 1904; and by V. Bailey, Wichita Mountains, August, 1906 (type).

Type U. S. National Herbarium no. 53167.

EXPLANATION OF PLATES LVI, LVII.—Plate LVI, potted plant. From photograph of one of Mr. Bailey's specimens. Plate LVII, face of flower from same individual.



NOPALEA LUTEA ROSE.

NOPALEA LUTEA, A NEW CACTUS FROM GUATEMALA.

By J. N. Rose.

In October, 1907, I described[a] *Nopalea guatemalensis*, which was then supposed to be the only endemic species of the genus in Guatemala. In December of the same year Prof. W. A. Kellerman wrote me from El Rancho that he had discovered there a second species. Abundance of material was collected, which, after the lamentable death of Professor Kellerman, was sent to Washington by his assistants, Mr. H. E. Barber and Mr. J. F. Zimmer.

Nopalea lutea Rose, sp. nov. PLATE LVIII.

Probably arborescent, joints obovate to spatulate, 1 to 1.5 cm. long; areoles about 2 cm. apart, large, made up of a prominent cushion of short hairs filled with numerous yellow spines and bristles; spines weak, usually about 2 cm. long; flower 5 cm. long; petals red, 2 cm. long; ovary covered with prominent areoles filled with weak yellow spines and bristles.

Collected by Prof. W. A. Kellerman and assistants, near El Rancho, Guatemala, altitude 300 meters, December 28, 1907 (no. 7046).

This species is very unlike the other known Nopaleas in having weak spines. Professor Kellerman says it differs from *N. guatemalensis* in having a honey-yellow green color instead of gray green. The flowers are smaller and of a lighter red color.

Type U. S. National Herbarium no. 535175.

EXPLANATION OF PLATE LVIII.—Two individuals. From photographs taken by Professor Kellerman.

[a] Smithson. Misc. Coll. 50: 330. 1907.

CONZATTIA A NEW GENUS OF CAESALPINIACEAE.

By J. N. Rose.

While collecting on the dry limestone hills west of Tehuacan, Mexico, in 1905, with Mr. Jos. H. Painter, I found a very curious leguminous tree which much resembles an Acacia in habit and foliage. It was long past flowering time and most of the pods were deformed or abortive, due to the sting of some insect, but a few unripe ones were found to which a stamen or two still clung, showing the relationship to be not with Acacia but with the Caesalpiniaceae. This material was brought to Washington and carefully examined, but could not be identified. In 1906, a little later in the season, I again visited Tehuacan and succeeded in gathering mature seeds, but still no flowers. Later in the same year Prof. C. Conzatti sent me specimens with immature pods, which he had obtained in June, and, finally, in 1907, he sent me flowers collected by him on May 12 of that year. Upon this material, together with a photograph showing the habit and also a seedling now growing in Washington, I am able to present a full diagnosis of this tree. It proves to be a very distinct genus, perhaps nearest Cercidium, but never thorny, and differing from it decidedly in other respects, especially in foliage and fruit. It gives me great pleasure to name it for my good friend, Prof. C. Conzatti, director de la Escuela Normal in the city of Oaxaca, Mexico, author of "Los Generos Vegetales Mexicanos," and a most painstaking botanical collector. He has on several occasions assisted me in my field work, as he has also many other naturalists, and has contributed many valuable specimens to the National Herbarium.

Conzattia Rose, gen. nov.

Calyx tube campanulate, very short, much shorter than the lobes; lobes valvate, becoming reflexed, subequal; petals 5, yellow, equal, distinct; stamens 10, erect; filaments glabrous except at the base, here hairy; ovary (in all specimens seen apparently abortive) white-woolly; legume strongly flattened, few-seeded, dehiscent, the seeds oblong, albuminous; cotyledons oblong, entire. Tree or large shrub, usually with a very distinct trunk and a broadly spreading top. Leaves large, twice-pinnate (seedling leaves once-pinnate) with many pinnæ and leaflets. Stipules minute. Flowers yellow, in slender racemes.

Conzattia arborea Rose, sp. nov. PLATE LIX.

A small tree or a shrub, 3 to 8 meters high, the trunk sometimes 3 meters long and 10 to 30 cm. in diameter, with a broad, rounded top; branches glabrous with somewhat reddish bark; leaves very large, 30 to 40 cm. long; pinnæ 10 to 15 pairs; leaflets about 20 pairs, oblong, 10 to 15 mm. long, acute, somewhat oblique at base, glabrous or a little pubescent along the margin when young; racemes clustered near the end of the branches, 6 to 12 cm. long, many-flowered; pedicels glabrous, jointed just below the flower; petals 7 to 8 mm. long; pods 8 to 15 cm. long, 10 to 15 mm. broad, glabrous, the margins narrowly winged, cuneate at base, acuminate at apex, 3 or 4-seeded; seeds oblong, lying lengthwise in the pod, 10 to 12 mm. long, glabrous, brown.

Distribution States of Puebla and Oaxaca, Mexico.

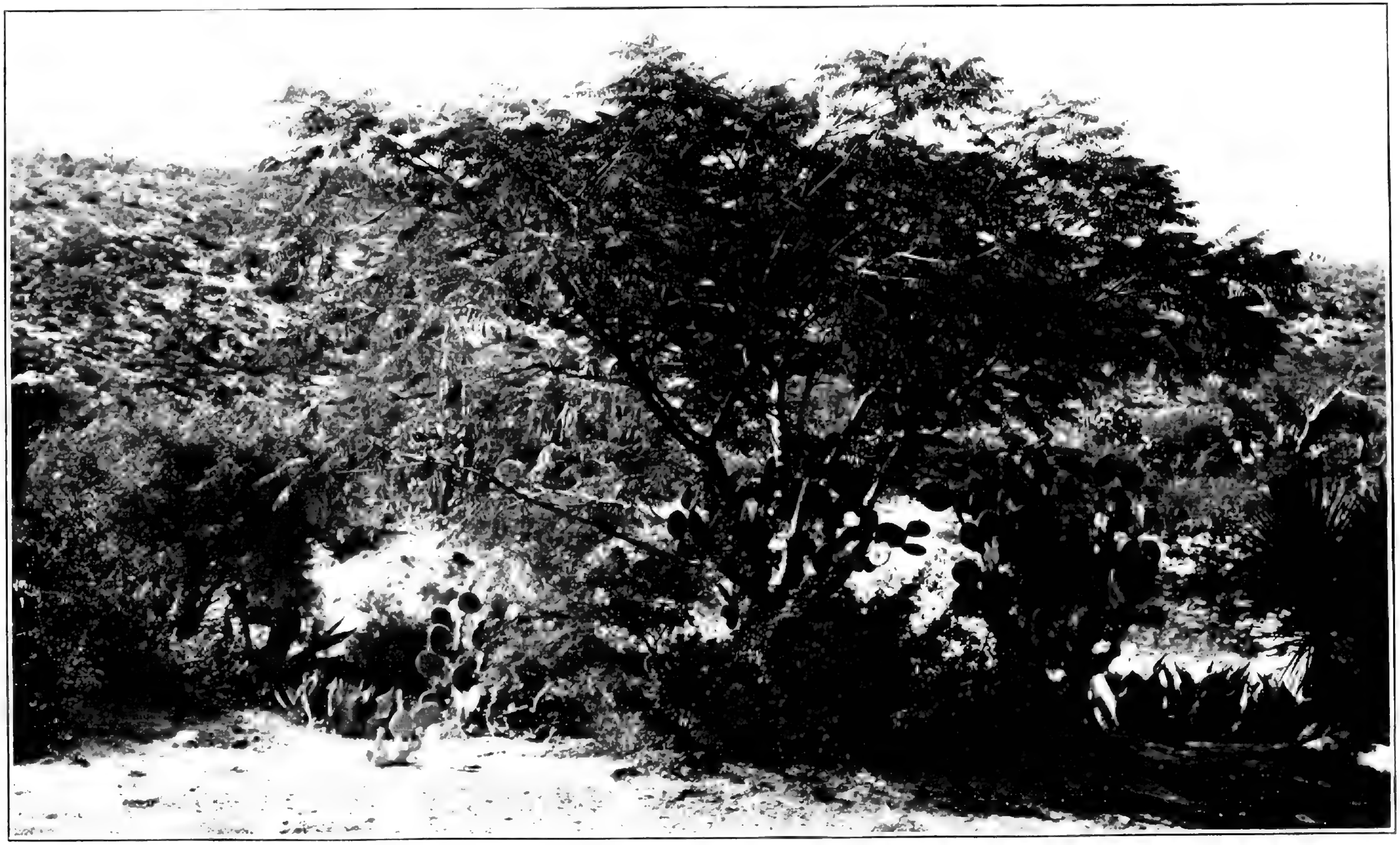
Specimens examined:

PUEBLA: Near Tehuacan, J. N. Rose and Jos. H. Painter, August 31, 1905 (no. 9893, type); same locality, J. N. Rose and J. S. Rose, September 8, 1906 (no. 11397).

OAXACA: On Cerro San Antonio, C. Conzatti, June 26, 1906 (no. 1421) and May 12, 1907.

Type U. S. National Herbarium no. 453386.

EXPLANATION OF PLATE LIX.—Field view, showing habit and conditions. From a photograph taken by Dr. D. T. McDougal and here reproduced by permission of the Carnegie Institution of Washington.



CONZATTIA ARBOREA ROSE.

TWO NEW SPECIES OF ACACIA OF THE SERIES FILICINAE.

By J. N. Rose.

When Bentham published his great work on the "Mimosaeae," in 1874, he reduced some 23 species of Acacia belonging to the series Filicinae to the two species *Acacia villosa* and *A. filicina*. Since then no one has published on the group and Bentham's conclusions have been generally accepted. Doctor Small, in his "Flora of the Southeastern United States," has restored one of these names, viz, *A. cuspidata*, and Dr. William Trelease has supplanted *filicina* by the older *filicioides*. A study of the material from Mexico and our border States convinces me that the group is sadly in need of revision. Recently I examined material grown near Tucson, where there seem to be two distinct species. One of them may be the Texan species *A. texana*, but the other is certainly undescribed. In the herbarium was found a third species from the Huachuca Mountains, likewise undescribed. These two species may be characterized as follows:

Acacia lemmoni Rose, sp. nov.

Branches stout, pilose; pinnæ 5 to 8 pairs; leaflets 9 to 20 pairs, green, oblong, acute, 6 to 8 mm. long, both middle and lateral nerves prominent; sepals and petals glabrous; pods pubescent, 4 to 6 cm. long, 8 mm. broad.

Collected by J. G. Lemmon on Huachuca Mountains, September, 1882.

Type U. S. National Herbarium no. 41089.

This species is stouter than the next and with larger acute and prominently veined leaflets.

Acacia suffrutescens Rose, sp. nov.

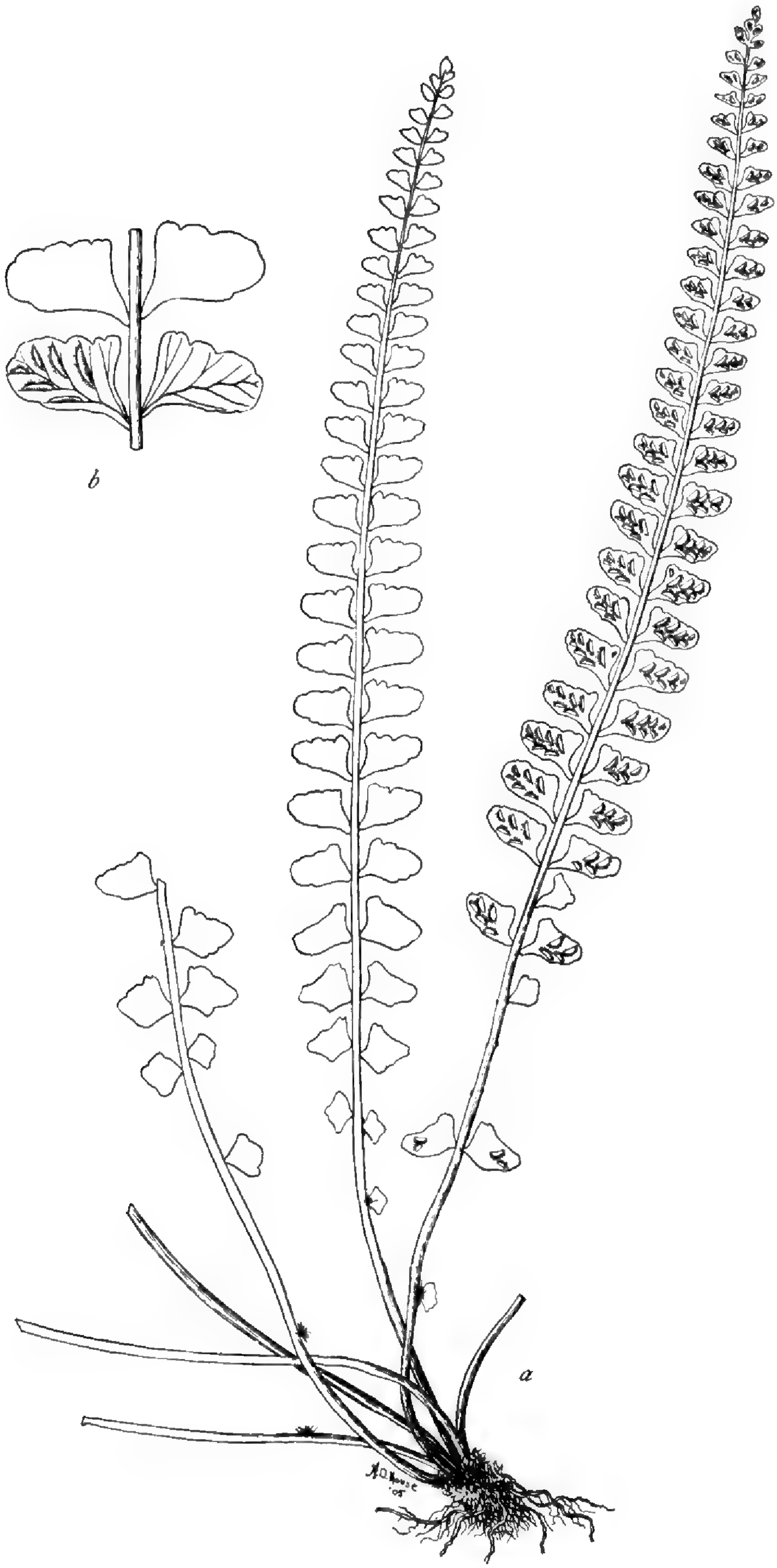
Stems low, 10 to 30 cm. high, shrubby at base, the top killing back each year; branches, rachis of leaves, and peduncle pilose; pinnæ usually 8 to 12 pairs; leaflets numerous, linear-oblong, 4 to 5 mm. long, acutish, glabrous, the veins indistinct except the central one; sepals and petals glabrous; fruit glabrous, 4 to 5 cm. long, 6 to 7 mm. broad.

Common in the valley and mountains near Tucson.

Specimens examined:

ARIZONA: Santa Cruz Valley, C. G. Pringle, 1881 (type); J. J. Thornber, near the same locality, September 20, 1901; J. F. James, near Tucson, June, 1880; J. N. Rose, lower part of Catalina Mountains, April, 1908 (no. 11806).

Type U. S. National Herbarium no. 41086.



ASPLENIUM MICROTUM MAXON.

A NEW SPLEENWORT FROM CHINA.

By William R. Maxon.

The Chinese fern here described as new was detected several years ago in the course of a study of *Asplenium trichomanes* and its allies. Its relationship is discussed below.

Asplenium microtum Maxon, sp. nov. PLATE LX.

Rhizome suberect, 5 to 7 mm. in diameter, thickly beset with rigid linear-lanceolate dark brownish scales about 2 mm. in length; fronds few (4 to 8), cespitose, divergent, subarcuate, 15 to 20 cm. long; stipes dull purplish black, flexuose, 2 to 3 cm. long; lamina 12 to 17 cm. long, 11 to 13.5 mm. broad, linear; pinnæ subcoriaceous, deciduous, 25 to 32-jugate, mostly opposite or subopposite, approximate or their width apart, gradually reduced both above and below; characteristic middle pinnæ 6 to 7 mm. long, sessile, subrhombic to oblong, the base appearing (in dried specimens) narrowly long-cuneate, somewhat excised below, auriculate above, the apex rounded, the margins lightly crenate-sinuate, revolute in drying; lower pinnæ shorter, broader, decidedly auriculate, somewhat reflexed, easily deciduous, the lowermost 2 or 3 distant, greatly reduced, subalternate or alternate, a minute, persistent bud with conspicuous chaff borne commonly at the base of the last or next to the last; stipe and rachis narrowly alate, the wing conspicuously erose-dentate or even serrate; sori medial, linear-oblong, usually 6 (in 3 pairs) or 7, the odd one in the upper row; indusia ample, firm, glabrous, the margin lightly sinuate; spores dark brown, ovoid, somewhat cristate, conspicuously alate and reticulate.

Type in the U. S. National Herbarium, no. 455004; from Mengtse, Yunnan, China, *A. Henry* (no. 10344). The same number in the herbarium of the Missouri Botanical Garden bears the additional data: "s. w. mts., alt. 6000 ft."

Mentioned by Christ,[a] some time ago, under the name *Asplenium trichomanes*, as a form "with distant strongly auriculate pinnæ." *A. microtum* is, apparently, a near relative of *A. trichomanes;* but from this, which, in a typical state at least, seems to be confined to North America and Europe, it differs very noticeably in (1) its subcoriaceous texture, (2) its auriculate pinnæ, these narrowly cuneate at the base (really less so than appears in the dried plants), (3) its strongly revolute and lightly crenate-sinuate margins, and (4) the presence of a minute but very chaffy bud upon the rachis, near its base. This last is a character noted hitherto, in the group of *Asplenium trichomanes*, only in *A. platyneuron* and *A. monanthes;* in the former very rarely; in the latter commonly, sometimes near the base, but often in the apical portion. A Mexican species of this group, as yet undescribed, has the fronds radicant and proliferous at the very apex.

For the drawing herewith reproduced the writer is indebted to Dr. H. D. House, of the Biltmore Forest School.

EXPLANATION OF PLATE LX.—*a*, Plant; *b*, segment of a frond. *a*, Natural size; *b*, scale 2.

[a] Bull. Herb. Boiss. 6: 960. 1898.

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[Synonyms in italics. Pages of principal entries in heavy-face type.]

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SMITHSONIAN INSTITUTION

UNITED STATES NATIONAL MUSEUM

CONTRIBUTIONS

FROM THE

UNITED STATES NATIONAL HERBARIUM

VOLUME XII, PART 10

MISCELLANEOUS PAPERS

By J. N. ROSE, N. L. BRITTON
JOHN M. COULTER, and
G. N. COLLINS

WASHINGTON
GOVERNMENT PRINTING OFFICE
1909

BULLETIN OF THE UNITED STATES NATIONAL MUSEUM.

ISSUED JULY 21, 1909.

PREFACE.

The present issue of the Contributions is made up of miscellaneous papers. The first three are continuations of studies published earlier in this series respectively on the Cactaceae, Crassulaceae, and Apiaceae, families which have presented unusual difficulties to botanists, and to which Dr. J. N. Rose, Associate Curator of the National Herbarium, has devoted special study in collaboration with Dr. N. L. Britton, of the New York Botanical Garden, and Prof. John M. Coulter, of the University of Chicago. The last paper, by G. N. Collins, Assistant Botanist in the Department of Agriculture, is an account of a remarkable development in a maize plant grown in a temperate climate from seed produced in the tropics. It is a suggestive illustration of the effect of environmental change.

These papers form the concluding part of Volume XII of the Contributions. The title-page and index of the volume will be issued later.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

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THE GENUS CEREUS AND ITS ALLIES IN NORTH AMERICA.

By N. L. Britton and J. N. Rose.

INTRODUCTION.

Studies of North American Cactaceae, conducted now for several years in the museums and greenhouses at New York and Washington and supplemented by field work in the West Indies, Mexico, and the southwestern United States, have rendered us familiar with the habit and morphology of a large number of species. The information thus obtained makes it clear that a considerable number of generic types must be recognized, additional to those established by previous authors, in order to present a rational classification of this family. We have been greatly aided in our study by A. Berger's admirable paper entitled, "A systematic revision of the genus Cereus Mill."[a] This is by far the most satisfactory treatment of the group which has ever appeared. We think, however, that he has erred in referring to Cereus the genera Cephalocereus and Echinocereus, which are now almost universally considered distinct.

But it is also true that these units have no more claim to generic rank than most of the other subgenera established by him. While, therefore, we differ from Mr. Berger as to the importance of these groups, we realize that he has been consistent and logical in his work. The genera have very distinct flower and fruit characters as well as clearly defined habit and stem structure. We have experienced some difficulty in forming a lineal arrangement of the genera which seemed to be logical. Mr. Berger's arrangement as given in his synopsis of the subgenera of Cereus is in the main satisfactory but has certain defects. We have formed a new arrangement which will be followed here, although further study will doubtless lead to various changes in it. Although the present paper deals only with North American species, we may express the conviction incidentally that Eulychnia of Philippi and Cleistocactus of Lemaire, South American groups, should be restored to generic rank.

In the present communication we submit a list, with bibliographic references and indication of geographic distribution and of type localities, of the genera and species with descriptions of the genera.

Plates LXV and LXVI and LXVIII to LXXIII are from photographs furnished by Dr. D. T. MacDougal, which are here used by courteous permission of the Carnegie Institute of Washington.

[a] Rep. Mo. Bot. Gard. **16**: 57–86. 1905.

DESCRIPTIONS OF GENERA WITH LISTS OF SPECIES.

1. **CEREUS** Mill. Gard. Dict. ed. 8. 1768.

CEREUS subgenus PIPTANTHOCEREUS Berger.

Night-flowering cacti with columnar upright, branching, ribbed, fluted or angled stems and branches, the areoles bearing several spines; flowers funnelform, elongated, the corolla falling away from a ring a little above the ovary after expanding; ovary bearing a few small scales but no spines nor wool; corolla tube nearly cylindric, somewhat expanded above, bearing a few similar scales, or naked; outer perianth segments obtuse, the inner acute, the petaloid ones bright white; stamens numerous, differing much in length; style included, the linear stigmas numerous; fruit fleshy, naked, sunken at the top, the persistent style recurved; seeds numerous, black, the testa punctate.

Type species *Cereus peruvianus* Mill.

Cereus hexagonus (L.) Mill. Gard. Dict. ed. 8. no. 1. 1768.

Cactus hexagonus L. Sp. Pl. 466. 1753.

Cactus peruvianus L. Sp. Pl. 467. 1753.

Cereus peruvianus Mill. Gard. Dict. ed. 8. no. 4. 1768.

Cereus alacriportanus Mart.; Pfeiff. Enum. Cact. 87. 1837.

TYPE LOCALITY: Jamaica; there, however, not indigenous but introduced from Peru.

DISTRIBUTION: South America; widely planted and naturalized in the West Indies and Central America.

ILLUSTRATIONS: Vell. Fl. Flum. *pl. 18. 19;* Pfeiff. Abb. u. Beschr. *pl. 5;* DC. Mem. Mus. Paris **17:** *pl. 11.*

Clearly of South American origin.

Cereus jamacaru DC. Prod. **3:** 467. 1828. PLATE LXI.

TYPE LOCALITY: In Brazil.

DISTRIBUTION: South America. Planted in the West Indies; perhaps naturalized on some islands.

ILLUSTRATION: Pison, Hist. Nat. Bras. 100. *f. 1;* Bot. Mag. **95:** *pl. 5775,* as *C. lividus.*

EXPLANATION OF PLATE LXI.—From a photograph taken by M. A. Howe, at Santurce, Porto Rico.

Cereus nudiflorus Engelm. Anal. Acad. Cienc. Habana **6:** 98. 1869.

TYPE LOCALITY: Beaches near Havana and Guantanamo, Cuba.

DISTRIBUTION: Cuba.

ILLUSTRATIONS: Contr. Nat. Herb. **12:** *pls. 49–51;* Journ. N. Y. Bot. Gard. **10:** *pl. 18.*

Erroneously referred by Schumann to *Cereus lepidotus* Salm-Dyck, a native of northern South America, planted in the West Indies.

2. **RATHBUNIA** gen. nov.

Plants not large, the stem and branches often weak; spines stout, those of the flowering areoles not differing from the others; flowers diurnal, single from the areoles, very narrow and elongated, trumpet-shaped, somewhat curved, oblique at mouth, scarlet; petals very short, spreading, reflexed, or rolled back; stamens inserted near the middle of the tube, exserted; fruit globular; seeds black, compressed, minutely pitted, with a large basal oblique hilum.

Named for Dr. Richard Rathbun, Assistant Secretary of the Smithsonian Institution in charge of the U. S. National Museum, a well-known authority on marine invertebrates.

Type species *Cereus sonorensis* Runge.

CEREUS JAMACARU (L.) MILL.

Rathbunia alamosensis (Coult.).

Cereus alamosensis Coult. Contr. Nat. Herb. **3:** 406. 1896.

TYPE LOCALITY: Near Alamos, Sonora.

DISTRIBUTION: Southern Sonora and northern Sinaloa, Mexico.

Rathbunia kerberi (Schum.).

Cereus kerberi Schum. Gesamtb. Kakteen 89. 1899.

TYPE LOCALITY: On Volcano of Colima, Mexico.

DISTRIBUTION: Sinaloa, Tepic, and Colima, Mexico.

Rathbunia sonorensis (Runge).

Cereus sonorensis Runge in Schum. Monatssch. Kakteenk. **11:** 135. 1901.

TYPE LOCALITY: In Sonora.

DISTRIBUTION: Central Sonora, Mexico.

ILLUSTRATION: Monatssch. Kakteenk. loc. cit.; Schumann, Gesamtb. Kakteen Nachtr. *f. 4*, as *C. stellatus;* Ann. Rep. Mo. Bot. Gard. **16:** *pl. 3. f. 5.*

3. CEPHALOCEREUS Pfeiff. Allg. Gartenz. **6:** 142. 1838.

Usually very large plants, either with a simple trunk or more or less branched; upper areoles usually developing wool, in some species forming a distinct cephalium either at the top or at one side near the top; flowers nocturnal, thick, fleshy, comparatively small, one from an areole, with a short definite funnel-shaped tube with few bracts; sepals and petals rather fleshy; ovary globular, naked or with a few bracts, spineless; fruit a small globular or depressed-globose berry; seeds numerous, small, reticulate, black or brownish, shining, with an oblique basal depressed hylum.

Type species *Cactus senilis* Haw. (which is also the type species of Pilocereus Lem. Cact. Gen. Nov. & Sp. 6. 1839).

Cephalocereus aleusis (Weber).

Pilocereus aleusis Weber; Gosselin, Bull. Mus. Paris **11:** 508. 1905.

TYPE LOCALITY: Sierra del Alo (and near Manzanillo, in forests bordering the sea), Mexico.

DISTRIBUTION: Known only from the type locality, but doubtless of wider distribution. Clearly a Cephalocereus, but known to us only from description.

Cephalocereus bahamensis Britton, sp. nov.

Plant 3 to 4 meters high, often 20 cm. thick at the base, the branches divergent-ascending, 7 to 9 cm. thick, dull green, not pruinose, 10 or 11-ribbed, the ribs blunt or acutish, rather higher than wide; areoles 1 to 1.5 cm. apart; spines 15 to 20, acicular, radiately spreading and ascending, gray-brown to yellow-brown when old, 1 to 1.5 cm. long, the young ones yellowish with darker bases, the uppermost 2.5 to 3 cm. long; wool very short (shorter than the spines), or none; flower 5 to 6 cm. long, brownish outside, the petals creamy-white; style slightly exserted; fruit depressed-globose, 3 to 4 cm. in diameter.

BAHAMAS: Frozen Cay, Berry Islands (*Britton & Millspaugh* 2221, January 30, 1905, type); Eleuthera (*Britton & Millspaugh* 5431); Andros (*Northrop* 699; *Brace* 5054); Cat Island (*Wilson* 7185); Crooked Island (*Brace* 4695); Abaco (*Brace* 2051).

Cephalocereus bakeri, sp. nov.

Plant 3 to 4 meters high, branching near and above the base, the branches 7 to 10 cm. thick, dull green, slightly glaucous; ribs 10 or 11, acutish; areoles 1 to 1.5 cm. apart; spines 15 to 20, acicular, 1 to 2.5 cm. long, yellow when young, becoming gray; flowering areoles closely set, producing only short yellow spines, the centrals hardly different from the radials; flowers deep purple, glaucous, 5 cm. long; ovary naked except for a few ovate bracts.

Collected by C. F. Baker at Cojimar, Province of Havana, Cuba, March 14, 1905 (no. 2731); collected also by C. Wright (no. 2621) and recorded by Grisebach as *C. royeni armatus.*

Cephalocereus chrysacanthus (Weber).

Pilocereus chrysacanthus Weber; Schum. Gesamtb. Kakteen 178. 1899.

Cereus chrysacanthus Orcutt, West. Am. Scientist **13:** 63. 1902.

TYPE LOCALITY: Near Tehuacan, Mexico.

DISTRIBUTION: Type locality and vicinity.

ILLUSTRATIONS: MacDougal, Bot. N. Am. Deserts *pl. 17* in part.

Cephalocereus colombianus Rose, sp. nov. PLATES LXII, LXIII.

Tree, 5 to 6 meters high, more or less branched throughout, the branches nearly erect; ribs 8, obtuse; spines very many, 25 or more, long and slender; wool from the areoles long and white, produced for 1 meter down from the top; flowers 7 cm. long, smooth, pale pink.

Collected by H. Pittier at Venticas del Dugua, Western Cordillera of Colombia in the State of Cauca, altitude 600 to 900 meters, February 22, 1906, type; also by W. R. Maxon at Puerto, Colombia (no. 3845). To be looked for in Panama.

Described from photographs and a living specimen.

EXPLANATION OF PLATES LXII, LXIII.—Pl. LXII, plant. Pl. LXIII cross section and portion of surface showing spines; flower and bud. Both from photographs taken by H. Pittier.

Cephalocereus cometes (Scheidw.).

Cereus cometes Scheidw. Allg. Gartenz. **8:** 339. 1840.

Pilocereus jubatus Salm-Dyck, Cact. Hort. Dyck. 24. 1845.

Cereus flavicomus Salm-Dyck, Cact. Hort. Dyck. ed. 2. 202. 1850.

Pilocereus cometes Mittl.; Först. Handb. Cact. 357. 1846, as synonym.

Pilocereus flavicomus Salm-Dyck; Rümpl. Först. Handb. Cact. ed. 2. 658. 1886.

TYPE LOCALITY: Near San Luis Potosí, Mexico.

DISTRIBUTION: San Luis Potosí, Mexico.

Cephalocereus hermentianus (Monv.).

Cereus hermentianus Monv. Ill. Hortic. **6:** misc. 90. 1859.

Pilocereus hermentianus Lem.; Weber in Bois, Dict. Hort. 965. 1898.

TYPE LOCALITY: Not cited.

DISTRIBUTION: Haiti, according to Weber.

Described as having about 19 ribs.

Cephalocereus hoppenstedtii (Weber) Schum. in Engl. & Prantl, Pflanzenfam. **3**[6a]**:** 181. 1894.

Pilocereus hoppenstedtii Weber, Cat. Pfersdorff. 1864.

Cereus hoppenstedtii Berger, Ann. Rep. Mo. Bot. Gard. **16:** 70. 1905.

TYPE LOCALITY: Zapotitlan, near Tehuacán, Mexico.

DISTRIBUTION: Type locality and vicinity.

Cephalocereus keyensis sp. nov.

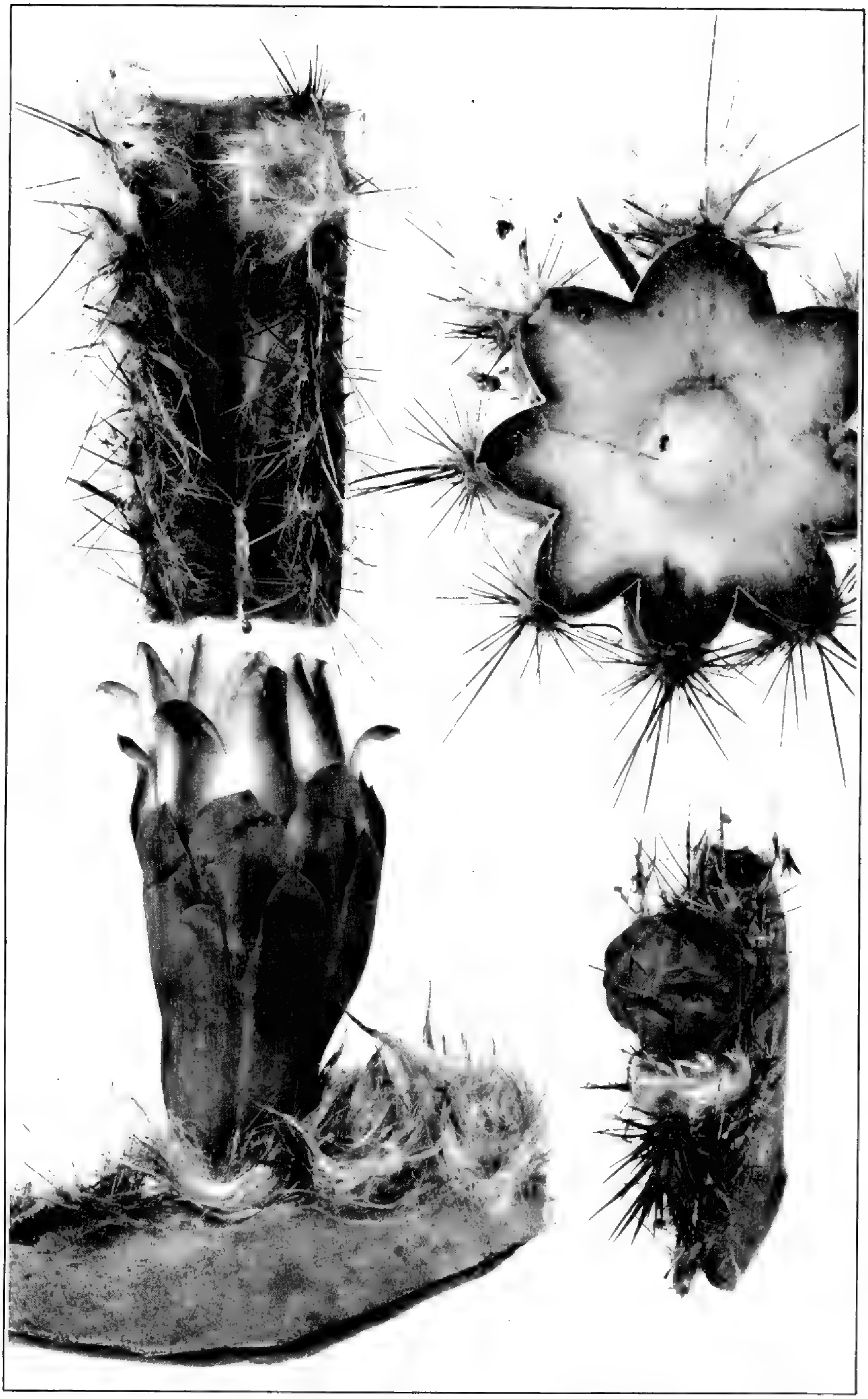
Plant 5 to 6 meters high, much branched, the branches almost erect, 5 to 6 cm. in diameter, the trunk up to 12 cm. thick; ribs 9 or 10, narrow, separated by deep grooves, blue green, very glaucous; areoles 1 to 2 cm. apart, slightly elevated; spines about 15, acicular, yellow, diverging, 1.5 cm. long or less; wool very short, less than 1 mm. long, white, turning grayish; flowers brownish purple, narrowly campanulate, 6 cm. long, with a strong odor of garlic when opening in the late afternoon or evening, odorless the next morning; outer perianth segments oblong-spatulate, bluntly pointed, the inner acutish; style scarcely exserted; fruit depressed-globose, reddish, 3.5 cm. thick, about 2 cm. high.

Hammock, Key West, Florida, N. L. Britton, April 7, 1909, no. 518, type; flowers collected also on Key West by A. H. Curtiss in 1885, and many years before by Dr. Blodgett. Doubtfully recorded by Dr. Chapman[a] as *C. monoclonos* DC., but the flowers described by him are those of Harrisia.

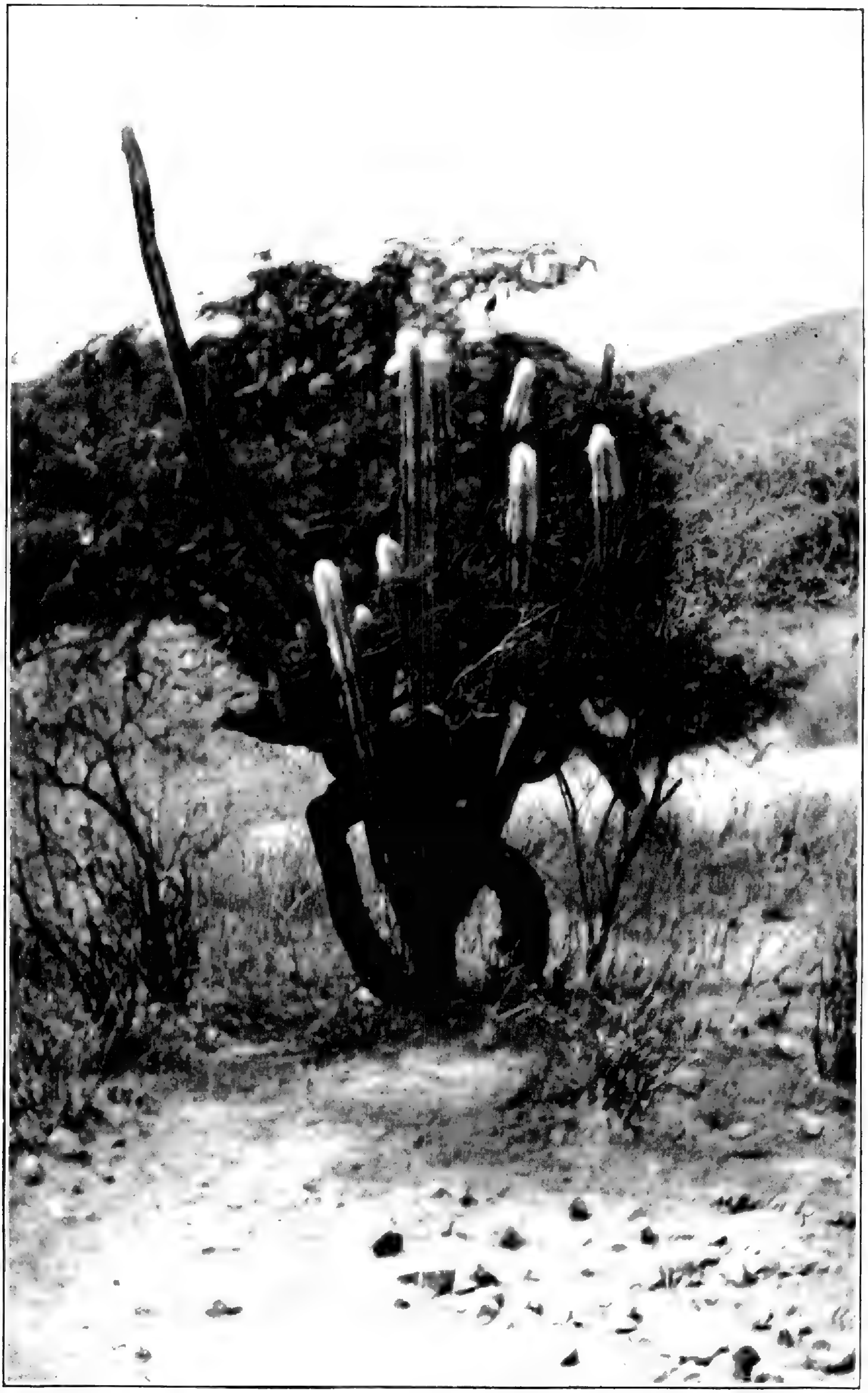
ILLUSTRATION: Journ. N. Y. Bot. Gard. **10:** *f. 25.*

[a] Southern Flo. 144.

CEPHALOCEREUS COLOMBIANUS ROSE.



CEPHALOCEREUS COLOMBIANUS ROSE.



CEPHALOCEREUS MAXONII ROSE.

Cephalocereus lanuginosus (L.).

Cactus lanuginosus L. Sp. Pl. 467. 1753.

Cereus lanuginosus Mill. Gard. Dict. ed. 8. no. 3. 1768, as to name only.

Cereus repandus Mill. Gard. Dict. ed. 8. no. 5. 1768.

Pilocereus lanuginosus Rümpl. Först. Handb. Cact. ed. 2. 672. 1886.

TYPE LOCALITY: Island of Curaçao, South America.

This species is commonly referred to Cuba, Porto Rico, and other West Indian Islands, but is apparently to be excluded from our range. Recently Miss Albertina Lens sent plants from the type locality which are very different from any of our North American material.

Cephalocereus leucocephalus (Poselg.).

Pilocereus leucocephalus Poselg. Allg. Gartenz. **21**: 126. 1853.

Pilocereus försteri Lem. Ill. Hortic. **13**: under *pl. 472*. 1866.

Pilocereus houlletii Lem. Rev. Hortic. **1862**: 428. 1862.

Cereus houlletii Berger, Ann. Rep. Mo. Bot. Gard. **16**: 70. 1905.

TYPE LOCALITY: Of *P. leucocephalus*, "prope Horcasetas" in Sonora, Mexico; of *P. houlletii*, "In Sonora."

DISTRIBUTION: Sonora and southeastern Chihuahua, Mexico.

ILLUSTRATIONS: Rev. Hortic. **1862**: *f. 38–41;* Rümpl. Först. Handb. Cact. ed. 2. *f. 89, 90;* Lem. Cact. *f. 5. 6*; Pflanzenfam. **3**[6a]: *f. 59. A, B.*

This species was described from cultivated specimens which were said to have come from "Sonora." So far as we know no species of this genus has in recent years been collected in Sonora, but Dr. E. Palmer collected from some Cephalocereus in a barranca near Batopilas, Chihuahua, in 1885, long hair similar to that figured by Lemaire. This barranca runs down into Sonora. Schumann only refers to a plant collected at Naulingo, between Vera Cruz and Jalapa. This is undoubtedly a different species.

Cephalocereus macrocephalus Weber; Schum. Gesamtb. Kakteen 197. 1899.

Cereus macrocephalus Berger, Ann. Rep. Mo. Bot. Gard. **16**: 62. 1905.

TYPE LOCALITY: Tehuacán, Mexico.

DISTRIBUTION: Type locality and vicinity.

ILLUSTRATIONS: Contr. Nat. Herb. **10**: *pl. 43B;* MacDougal, Bot. N. Am. Deserts *pl. 15.*

Cephalocereus maxonii Rose, sp. nov. PLATE LXIV.

Plant 2 to 3 meters high, with few long branches; in mature plants the tops of the branches for about 30 cm. clothed with long (4 to 5 cm.) white hairs; ribs 6 to 8, acute, pale blue and somewhat glaucous; areoles small; spines about 10, slender, yellow, the central single (4 cm. long), all nearly hidden by the long white hairs; flowers purple, 4 cm. long; ovary naked except for a few small bracts; fruits 3.5 cm. broad, broader than high; seeds brownish, reticulated with an oblique basal hilum.

Collected by William R. Maxon near El Rancho, Guatemala, April 4, 1905 (no. 3769, type); and later, seeds only, by W. A. Kellerman, January 10, 1908 (no. 7061). Also near Salamá, by Mr. Maxon (no. 3381).

Type U. S. National Herbarium no. 473710.

One living specimen is growing in Washington, and flowers and fruit are preserved in formalin. Prints from a number of good photographs taken by Cook and Collins, W. A. Kellerman, H. Pittier, and William R. Maxon have been mounted.

EXPLANATION OF PLATE LXIV.—From a photograph taken by William R. Maxon of a plant near Salamá.

Cephalocereus millspaughii Britton, sp. nov.

Stem branched, 2 to 6 meters high, 20 cm. thick at the base, the branches nearly erect, 8 to 12 cm. thick, pale grayish green, pruinose, 8 to 13-ribbed, the ribs

acutish, about as wide as high or a little wider; areoles 1 to 2 cm. apart; spines about 20, acicular, widely radiating, 1 to 2 cm. long, or at the flower-bearing (upper) areoles 3 to 7 cm. long, the old ones gray brown, the young ones yellow or yellow brown, with darker bases; upper areoles on one side of the plant with large tufts of whitish wool often as long as the spines or longer; flowers 6 cm. long; fruit depressed-globose, about two-thirds as long as thick.

BAHAMAS: Cave Cay, Exuma Chain, February 19, 1905, *Britton & Millspaugh* 2832, type; Conception Island, *Britton & Millspaugh* 6025; Watlings Island, *Britton & Millspaugh* 6112; Acklins Island, *Brace* 4300; Mariguana, *Wilson* 7567; South Caicos, *Wilson* 7678; Little Inagua, *Nash & Taylor* 1195; *Wilson* 7773.

Cephalocereus monoclonos (DC.).

Cereus monoclonos DC. Prod. **3**: 464. 1828.

TYPE LOCALITY: Caribbæan Islands.

ILLUSTRATION: Plumier, Pl. Am. ed. Burmann. *pl. 191.*

Clearly a Cephalocereus without wool, and presumably from Santo Domingo.

Cephalocereus nobilis (Haw.).

Cereus nobilis Haw. Syn. Pl. Succ. 179. 1812.

Cactus strictus Willd. Enum. Suppl. 32. 1813, not *C. strictus* Haw. 1803.

Cereus strictus DC. Prod. **3**: 465. 1828.

Pilocereus strictus Rümpl. Först. Handb. Cact. ed. 2. 687. 1886.

Pilocereus nobilis Schum. in Engl. & Prantl, Pflanzenfam. **3**^{6a}: 181. 1894.

Cactus haworthii Spreng. Syst. **2**: 495. 1825.

Cereus haworthii DC. Prod. **3**: 465. 1828.

Pilocereus haworthii Console; Lem. Rev. Hortic. **1862**: 428. 1862.

Pilocereus consolei Lem. loc. cit. 427. 1862.

Cereus curtisii Otto; Pfeiff. Enum. Cact. 81. 1837.

Pilocereus curtisii Salm-Dyck, Cact. Hort. Dyck. ed. 2. 40. 1850.

For additional synonymy see Schumann, Gesamtb. Kakteen 189.

TYPE LOCALITY: "West Indies."

DISTRIBUTION: St. Kitts to Grenada.

ILLUSTRATION: Bot. Mag. *pl. 3125*, as *Cereus royeni.*

Cephalocereus palmeri Rose, sp. nov.

Tree 2 to 6 meters high, with 20 or more branches (often 5 to 8 cm. in diameter), dark green or glaucous and bluish when young; ribs 7 to 9, rounded on the edge, rather closely set, clothed from top downward for 20 to 30 cm. with long white hairs (4 to 5 cm. long) usually hiding the spines; radial spines 8 or 12, slender, yellow when young; central one much longer than the others, 2 to 3 cm. long; areoles 1 cm. apart, scarcely woolly except toward the top; flowers 6 cm. long, somewhat tubular, brownish, the ovary without spines or hairs; fruit globular, about 6 cm. in diameter, naked but the surface somewhat warty; seeds black, shining, minutely pitted, 2 mm. long, oblique at base.

Collected by Dr. E. Palmer near Victoria, Mexico, February, 1907 (no. 362, type), and near the same place by E. A. Nelson, March 15, 1902 (no. 6665).

Type U. S. National Herbarium no. 572593.

Living specimens, including seedlings, are now growing in Washington.

It is called "organo," a common name also for *Cereus marginatus* and other species of Cereus.

Cephalocereus polygonus (Lam.).

Cactus polygonus Lam. Encycl. **1**: 539. 1783.

Cereus polygonus DC. Prod. **3**: 466. 1828.

Pilocereus plumieri Lem. Rev. Hortic. **1862**: 427. 1862.

TYPE LOCALITY: Santo Domingo.
DISTRIBUTION: Santo Domingo.
ILLUSTRATION: Plumier, Pl. Am. ed. Burmann *pl. 196.*
From the figure, which shows a plant without wool, and from the description, which mentions no wool, this resembles *C. bahamensis* Britton. It is doubtless a Cephalocereus.

Cephalocereus polylophus (DC.).
Cereus polylophus DC. Mem. Mus. Paris **17:** 115. 1828.
Pilocereus polylophus Salm-Dyck, Cact. Hort. Dyck. ed. 2. 40. 1850.
TYPE LOCALITY: "In Mexico."
DISTRIBUTION: Eastern Mexico.
Known to dealers in cacti as *Cereus nickelsii.*

Cephalocereus royeni (L.).
Cactus royeni L. Sp. Pl. 467. 1753.
Cereus royeni Haw. Syn. Pl. Succ. 182. 1812.
Pilocereus floccosus Lem. Ill. Hortic. **13:** under *pl. 470.* 1866.
Cereus armatus Otto; Pfeiff. Enum. Cact. 81. 1837.
Cereus floccosus Otto; Pfeiff. Enum. Cact. 81. 1837.
Pilocereus royeni Rümpl. Först. Handb. Cact. ed. 2. 682. 1886.
Pilocereus fouachianus Weber; Gosselin, Bull. Mus. Paris **10:** 386. 1904.
TYPE LOCALITY: In America, presumably St. Croix.
DISTRIBUTION: St. Croix, St. Thomas, Culebra, Porto Rico, Cuba?.
ILLUSTRATION: Journ. N. Y. Bot. Gard. **7:** *f. 4.*
The Cuban plant may prove to be specifically distinct.

Cephalocereus sartorianus Rose, sp. nov.
Plant 3 to 5 or more meters high with nearly erect branches, 7 to 10 cm. in diameter, light or yellowish green, apparently not pruinose; ribs (in three individuals examined) 7, 2 cm. deep, marked by a pair of grooves descending obliquely, one on each side, from the areoles; areoles closely set, usually 1.5 cm. apart; radial spines at first 7 or 8, others apparently developing later; central normally one; all spines short, 1 cm. or less long, at first straw-colored, in age grayish; all areoles producing few or many cobwebby hairs; the flowering areoles appearing on one side of the plant, in the specimen under observation on a single rib, and producing long white hairs 4 to 6 cm. long; flowers 6 to 8 cm. long, "dirty rose red;" fruit red.
Described from two young plants and the top of an old one sent by Dr. C. A. Purpus and the late Dr. A. Sartorius from the State of Veracruz, Mexico.
Type U. S. National Herbarium no. 574992.
This is doubtless the *Pilocereus houlletii* of Schumann's Monograph and of most writers, but the type of the original species came from Sonora, Mexico.
ILLUSTRATION: Blühende Kakteen *pl. 79,* as *Pilocereus houlletii.*

Cephalocereus scoparius (Poselg.).
Pilocereus scoparius Poselg. Allg. Gartenz. **21:** 126. 1853.
TYPE LOCALITY: Soledad, near Veracruz, Mexico.
DISTRIBUTION: Type locality and vicinity.

Cephalocereus senilis (Haw.) Pfeiff. Allg. Gartenz. **6:** 142. 1838.
Cactus senilis Haw. Phil. Mag. **63:** 41. 1824.
Cereus senilis DC. Prod. **3:** 464. 1828.
Pilocereus senilis Lem. Cact. Gen. & Sp. Nov. 6. 1839.
Cactus bradypus Lehm. Index Sem. Hamburg 17. 1826.
TYPE LOCALITY: Mexico.
DISTRIBUTION: Hidalgo and Guanajuato, Mexico.

ILLUSTRATIONS: Lehm. Nov. Act. Acad. Nat. Cur. **16**[1]: *pl. 12;* Monatssch. Kakteenk. **1**: 32; Monatssch. Kakteenk. **4:** 124, 125; Gesamtb. Kakteen *f. 40;* Rev. Hort. **1889:** *f. 139;* **1890:** *f. 38, 39;* Rümpl. Först. Handb. Cact. ed. 2. *f. 91, 92;* Engl. & Prantl, Nat. Pflanzenf. **3**[6a]**:** *pl. 2. f. 60.*

Cephalocereus swartzii (Griseb.).

Cereus swartzii Griseb. Fl. Brit. West Ind. 301. 1860.

TYPE LOCALITY: Jamaica.

DISTRIBUTION: Jamaica.

Cephalocereus urbanianus (Schum.).

Pilocereus urbanianus Schum. Gesamtb. Kakteen 193. 1899.

TYPE LOCALITY: Guadaloupe.

DISTRIBUTION: Guadaloupe.

The following is clearly a Cephalocereus, but is known to us only from the description:

PILOCEREUS SCHLUMBERGERI Weber; Schum. Gesamtb. Kakteen 186. 1899.

TYPE LOCALITY: Not cited.

DISTRIBUTION: Haiti, in the vicinity of Gonaives, according to Weber, as cited by Schumann, Gesamtb. Kakteen Nachtr. 66.

Described as having 13 ribs, and clearly a Cephalocereus, but known to us only from the description. *C. polygonus*, from the same island, is figured as with 11 ribs, but without any wool.

4. ESCONTRIA Rose, Contr. Nat. Herb. 10: 125. 1906.

Large and much branched plants; ribs few; spines all similar, arranged in peculiar pectinate clusters; flowers small, yellow, tubular, one from an areole, diurnal; ovary globular, covered with imbricating chartaceous translucent persistent scales without spines or hairs; petals erect, narrow; stamens and style included; fruit globular, scaly, purple, fleshy, edible; seeds numerous, black.

Type species *Cereus chiotilla* Weber.

Only one species is known.

Escontria chiotilla (Weber) Rose, Contr. Nat. Herb. **10:** 126. 1906. PLATE LXV.

Cereus chiotilla Weber; Schum. Gesamtb. Kakteen 83. 1899.

TYPE LOCALITY: "Oajaca."

DISTRIBUTION: Oaxaca, Mexico.

ILLUSTRATIONS: Rose, loc. cit. *pl. 43A.*

EXPLANATION OF PLATE LXV.—From a photograph taken by Dr. D. T. MacDougal.

5. PACHYCEREUS gen. nov.

Usually very large plants, more or less branched from a definite trunk; flowers diurnal (?), with a rather short tube; petals short, spatulate; stamens included, numerous, inserted along the throat; style included; ovary and tube covered with small bracts and woolly hairs and bristles; fruit large, bur-like, dry, densely covered with clusters of deciduous spines and bristles; seeds large and black.

Type species *Cereus pringlei* S. Wats.

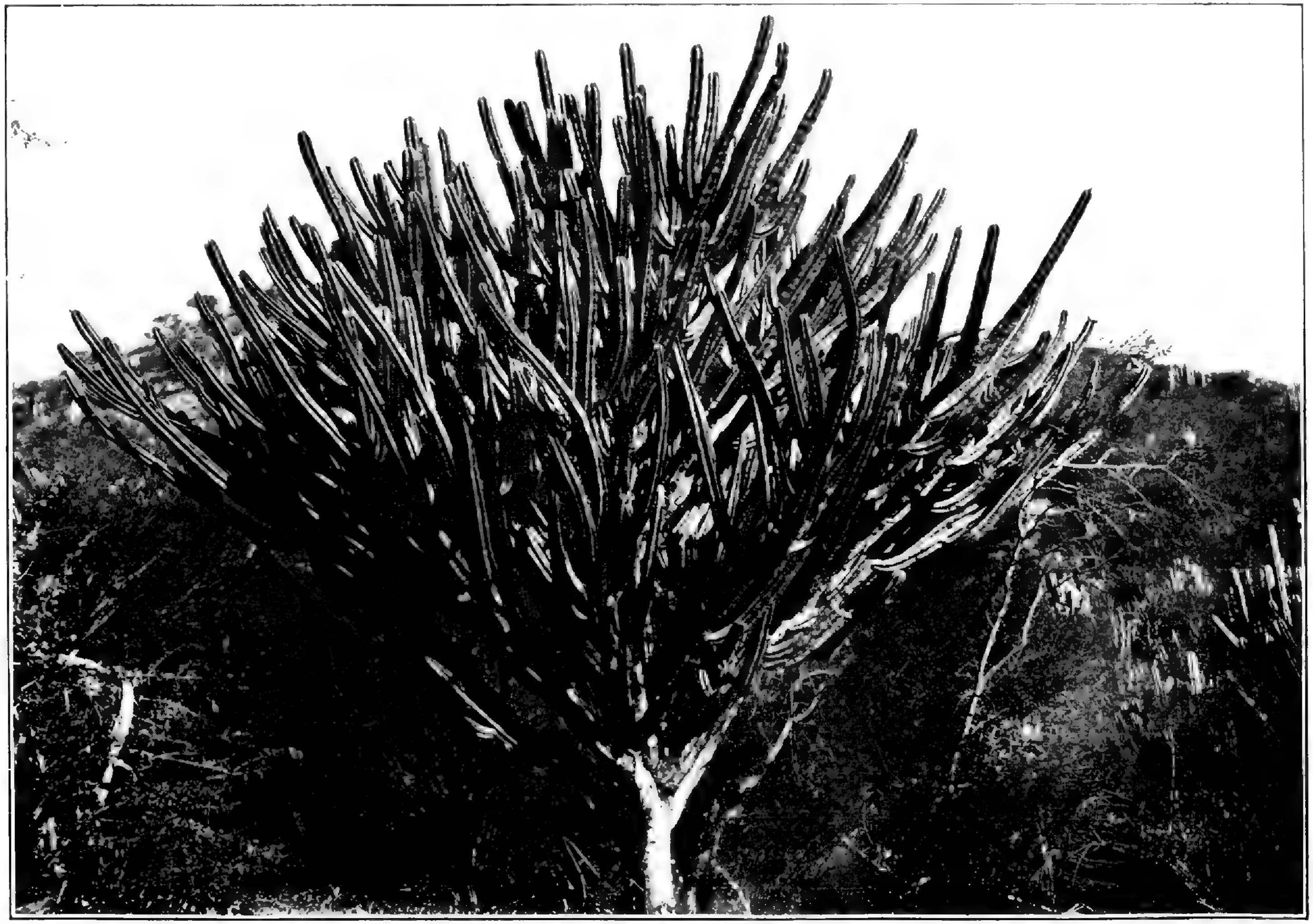
This was made a subgenus by A. Berger, whose name we have adopted.

Pachycereus calvus (Engelm.).

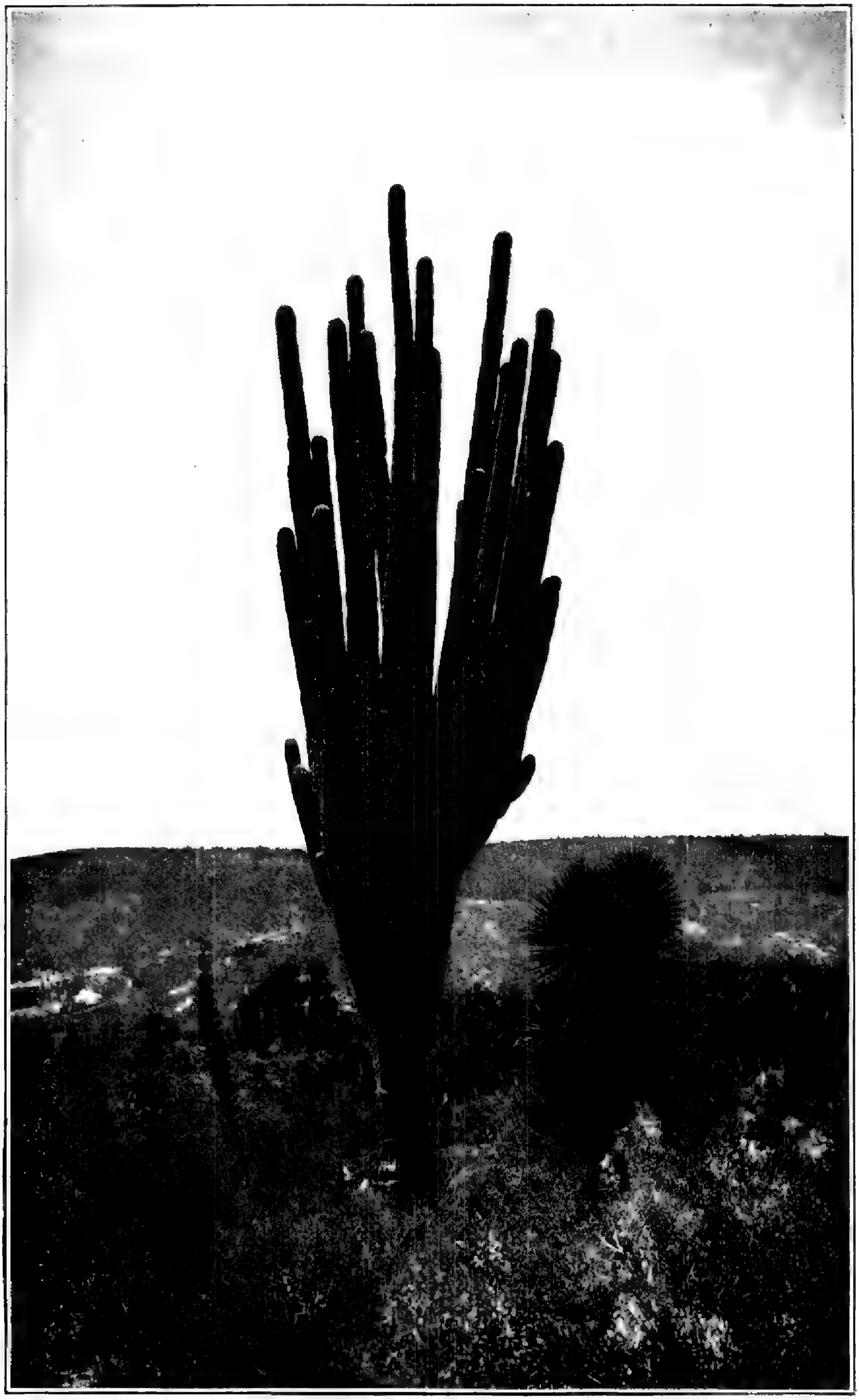
Cereus calvus Engelm.; Coult. Contr. Nat. Herb. **3:** 409. 1896.

TYPE LOCALITY: "From Cape San Lucas northward," Lower California.

DISTRIBUTION: Southern Lower California.



ESCONTRIA CHIOTILLA (WEBER) ROSE.



PACHYCEREUS CHRYSOMALLUS (LEM.) BRITTON & ROSE.

Pachycereus chrysomallus (Lem.) PLATE LXVI.

Cephalocereus chrysomallus (Lem.) Schum. in Engl. & Prantl, Pflanzenfam. **3**[6a]: 182. 1894.

Pilocereus chrysomallus Lem. Fl. Serres **3:** sub *pl. 242.* 1847.

Cereus chrysomallus Hemsl. Biol. Centr. **1:** 541. 1880.

Pilocereus fulviceps Weber; Schum. Gesamtb. Kakteen 176. 1899.

Cereus fulviceps Berger, Ann. Rep. Mo. Bot. Gard. **16:** 64. 1905.

Pilocereus rupiceps Weber; Gosselin, Bull. Mus. Paris **11:** 506. 1905.

TYPE LOCALITY: In Mexico.

DISTRIBUTION: Puebla and Oaxaca, Mexico.

ILLUSTRATIONS: Contr. Nat. Herb. **10:** *pl. 18;* MacDougal, Bot. N. Am. Deserts *pl. 16.*

EXPLANATION OF PLATE LXVI.—From a photograph taken by Dr. D. T. MacDougal.

Pachycereus columna-trajani (Karw.).

Cephalocereus columna-trajani (Karw.) Schum. in Engl. & Prantl, Pflanzenfam. **3**[6a]: 182. 1894.

Cereus columna-trajani Karw.; Pfeiff. Enum. Cact. 76. 1837.

Pilocereus columna Lem. Cact. Gen. & Sp. 9. 1839.

Pilocereus lateribarbatus Pfeiff.; Rümpl. Först. Handb. Cact. ed. 2. 672. 1886.

Cereus tetazo Coult. Contr. Nat. Herb. **3:** 409. 1896.

Pilocereus tetetzo Weber; Schum. Gesamtb. Kakteen 175. 1899.

TYPE LOCALITY: San Sebastián, Puebla, Mexico.

DISTRIBUTION: Puebla and Oaxaca, Mexico.

ILLUSTRATIONS: Rev. Hortic. **1890:** 129. *f. 40;* MacDougal, Bot. N. Am. Deserts *pl. 22.*

Pachycereus grandis Rose, sp. nov.

Large plants 6 to 10 meters high, often with a single erect trunk but generally, especially in old plants, much branched near the base, the trunk sometimes 1 meter in diameter; branches columnar and generally simple, becoming erect almost from the first, repeatedly constricted (this especially noticeable from a distance), pale green in color; ribs 9, 10, or 11, acute; areoles 2 to 3 cm. apart, not running together nor extending below the spines as in *P. pecten-aboriginum;* old spines grayish or white with black tips; radial spines 9 or 10; centrals 3, the lower one longer (sometimes 6 cm. long), somewhat flattened laterally, the two upper opposite, similar to the radial; flowering areoles very large, elliptical, 2 cm. long, thickly set below with stout brown bristles, in the upper half with short yellow bristles; flowers rather small, about 4 cm. long; ovary and corolla tube covered with tawny wool; fruit large, globular, dry, covered with long yellow bristles and yellowish wool.

Collected on the pedregal near Cuernavaca by J. N. Rose and J. S. Rose, August 14, 1906 (no. 11087).

Type U. S. National Herbarium no. 453872.

This giant cactus is common on the edge of the pedregal near Cuernavaca and extends for many miles down the valley southward.

The species is near *P. pecten-aboriginum* but is generally more branched and probably larger. Technically, it has very different areoles and much longer spines.

Pachycereus marginatus (DC.).

Cereus marginatus DC. Mem. Mus. Paris **17:** 116. 1828.

Cereus gemmatus Zucc.; Pfeiff. Enum. Cact. 96. 1837.

TYPE LOCALITY: Mexico.

DISTRIBUTION: Hidalgo, Querétaro, and Guanajuato, Mexico.

ILLUSTRATIONS: Contr. Nat. Herb. **5:** *pl. 59, 60.*

Pachycereus orcuttii (K. Brandegee).
Cereus orcuttii K. Brandegee, Zoe **5:** 3. 1900.
TYPE LOCALITY: Rosario, Lower California.
DISTRIBUTION: Known only from the type locality.

Pachycereus pringlei (S. Wats.).
Cereus pringlei S. Wats. Proc. Am. Acad. **20:** 368. 1885.
TYPE LOCALITY: "South of the Altar River," Sonora, Mexico.
DISTRIBUTION: Sonora and northeastern Lower California.
ILLUSTRATION: Ann. Rep. Mo. Bot. Gard. **16:** *pl. 1.*

Pachycereus pecten-aboriginum (Engelm.).
Cereus pecten-aboriginum Engelm.; S. Wats. Proc. Am. Acad. **21:** 429. 1886.
TYPE LOCALITY: Hacienda San Miguel, Chihuahua.
DISTRIBUTION: Chihuahua and Sonora; southern Lower California.
ILLUSTRATION: Gard. & For. **7:** *f. 54.* Contr. Nat. Herb. **5:** *pl. 57, 58, f. 32.*

Pachycereus queretarensis (Weber).
Cereus queretarensis Weber; Mathsson, Monatssch. Kakteenk. **1:** 28. 1891.
TYPE LOCALITY: In Querétaro, Mexico,
DISTRIBUTION: Central Mexico.

Pachycereus titan (Engelm.).
Cereus titan Engelm.; Coult. Contr. Nat. Herb. **3:** 409. 1896.
TYPE LOCALITY: From Cape San Lucas to San Quentin, Lower California.
DISTRIBUTION: Southern Lower California.

6. **HARRISIA** Britton, Bull. Torr. Club **35:** 561. 1908.

Night-flowering cacti with slender upright-branched cylindric stems, the branches fluted, with from 8 to 11 rounded ribs separated by shallow grooves bearing areoles at frequent intervals, each areole with several acicular spines; flowers borne at areoles near the ends of the branches, funnelform, large, with a cylindric scaly but spineless tube as long as the limb or longer; buds globose, ovoid or obovoid, densely scaly, the scales bearing long or short woolly hairs; sepals pink or greenish, linear-lanceolate; petals white; stamens shorter than the petals; style somewhat longer than the stamens; fruit globose to ovoid-globose, green to yellow, spineless but with deciduous scales, the corolla withering-persistent; seeds very numerous, small.

Type species *Cereus gracilis* Mill.

Harrisia eriophora (Pfeiff.) Britton, Bull. Torr. Club **35:** 562. 1908.
Cereus cubensis Zucc.; Seitz, Allg. Gartenz. **2:** 244. 1834.
Cereus eriophorus Pfeiff. Enum. Cact. 94. 1837.
TYPE LOCALITY: Cuba.
DISTRIBUTION: Cuba.
ILLUSTRATION: Pfeiff. & Otto, Abb. u. Beschr. Cact. *pl. 22;* Blühende Kakteen *pl. 84.*

Harrisia brookii Britton, Bull. Torr. Club **35:** 564. 1908.
TYPE LOCALITY: Georgetown, Long Island, Bahamas.
DISTRIBUTION: Bahama Islands; Florida Keys.

Harrisia fernowi Britton, Bull. Torr. Club **35:** 562. 1908.
Cereus pellucidus Griseb. Cat. Pl. Cub. 116. 1866, not Otto, 1837.
TYPE LOCALITY: Between Ric Grande and Rio Ubero in eastern Cuba.
DISTRIBUTION: Eastern Cuba.

Harrisia gracilis (Mill.) Britton, Bull. Torr. Club **35:** 563. 1908.
Cereus gracilis Mill. Gard. Dict. ed. 8. no. 8. 1768.
Cereus repandus Haw. Syn. Pl. Succ. 183. 1812, not *Cactus repandus* L. 1753.
?Cereus subrepandus Haw. Suppl. Pl. Succ. 78. 1819.
TYPE LOCALITY: "British Islands of America."
DISTRIBUTION: Jamaica.

Harrisia nashii Britton, Bull. Torr. Club **35:** 564. 1908.
TYPE LOCALITY: Between Gonaives and Plaisance, Haiti.
DISTRIBUTION: Haiti.
ILLUSTRATION: Descourt. Fl. Med. Antill. **1:** *pl. 66*, as *Cactus divaricatus*.

Harrisia portoricensis Britton, Bull. Torr. Club **35:** 563. 1908.
TYPE LOCALITY: Near Ponce, Porto Rico.
DISTRIBUTION: Porto Rico.

Harrisia taylori Britton, Bull. Torr. Club **35:** 565. 1908.
TYPE LOCALITY: Between Rio Grande and Rio Ubero, in eastern Cuba.
DISTRIBUTION: Cuba.

Harrisia undata (Pfeiff.) Britton, Bull. Torr. Club **35:** 564. 1908.
Cereus undatus Pfeiff. Enum. Cact. 94. 1837.
TYPE LOCALITY: Not given.
DISTRIBUTION: Eastern Cuba.
ILLUSTRATIONS: Pfeiff. & Otto, Abb. u. Beschr. Cact. *pl. 23*.

The following two species now under Cereus are likely to prove to be members of this genus:

CEREUS DIVARICATUS Lam. Encycl. **1:** 540. 1783.
Cereus divergens Pfeiff. Enum. Cact. 95. 1837.
Pilocereus divaricatus Lem. Rev. Hort. **1862:** 427. 1862.
TYPE LOCALITY: Santo Domingo.
DISTRIBUTION: Santo Domingo and Haiti.
ILLUSTRATION: Plumier, Pl. Amer. ed. Burmann *pl. 193*.

CEREUS ERECTUS Karw.; Pfeiff. Enum. Cact. 95. 1837.
TYPE LOCALITY: Mexico.

7. NYCTOCEREUS gen. nov.

Erect or straggling, slender, sparingly branched cacti, with cylindric fluted stems and branches, the numerous areoles bearing a tuft of short white wool and small radiating acicular bristles or weak spines; flowers large, white, nocturnal; ovary bearing small scales and tufts of weak spines or bristles; corolla funnelform, the nearly cylindric tube gradually expanded above, bearing scales and tufts of weak bristles below the middle, above the middle bearing distant, narrowly lanceolate scales, which grade into the blunt outer perianth segments; inner perianth segments widely spreading, obtuse or acutish; stamens numerous, shorter than the perianth; style about as long as the stamens; fruit scaly and spiny or bristly. The genus is, perhaps, heterogamous.

Type species *Cereus serpentinus* DC.

Nyctocereus was considered a subgenus by A. Berger under this name.

Nyctocereus serpentinus (Lag. & Rodrig.).
Cactus serpentinus Lag. & Rodrig. Anal. Cienc. Nat. **4:** 261. 1801.
Cactus ambiguus Bonpl. Pl. Jard. Novar. et Malmais. *pl. 38*. 1803.
Cereus serpentinus DC. Prod. **3:** 467. 1828.

Cereus ambiguus DC. loc. cit.
Echinocereus serpentinus Lem. Cact. 57. 1868.
TYPE LOCALITY: None given; described from garden plant.
DISTRIBUTION: Mexico.
ILLUSTRATIONS: Link & Otto, Ic. Pl. Select. *pl. 42;* Bonpl. loc. cit.; DC. Mem. Mus. Paris **17:** *pl. 12;* Bot. Mag. **64:** *pl. 3566;* Regel, Gartenfl. *pl. 1079.*

Nyctocereus hirschtianus (Schum.).
Cereus hirschtianus Schum. Gesamtb. Kakteen 130. 1899.
TYPE LOCALITY: Nicaragua.
DISTRIBUTION: Known only from the type locality.
ILLUSTRATION: Gesamtb. Kakteen *f. 31.*

Nyctocereus neumannii (Schum.).
Cereus neumannii Schum. Gesamtb. Kakteen Nachtr. 37. 1903.
TYPE LOCALITY: Near Chiquitillo, Metagalpa, Nicaragua.
DISTRIBUTION: Known only from the type locality.

8. CARNEGIEA Britt. & Rose, Journ. N. Y. Bot. Gard. 9: 187. 1908.

Usually very large plants with stout upright stems and few or no branches, strongly ribbed, the spines on flowering and sterile areoles very different; flowers borne on the uppermost areoles, diurnal, funnelform, thickish, the tube nearly cylindrical, about half as long as the limb, bearing a few broadly triangular, ovate, acute scales with tufts of wool in their axils; petals white, short, widely spreading and somewhat reflexed when fully expanded; ovary spineless or nearly so, oblong, covered with scales similar to those of the tube but somewhat closer together; stamens very numerous, about three-quarters as long as the petals; stigmas 12 to 18, narrowly linear, reaching a little above the stamens; fruit an oblong or somewhat obovoid berry containing red pulp and bearing small distinct scales; seeds very small, numerous, black, and shining.

Type species *Cereus giganteus* Engelm.

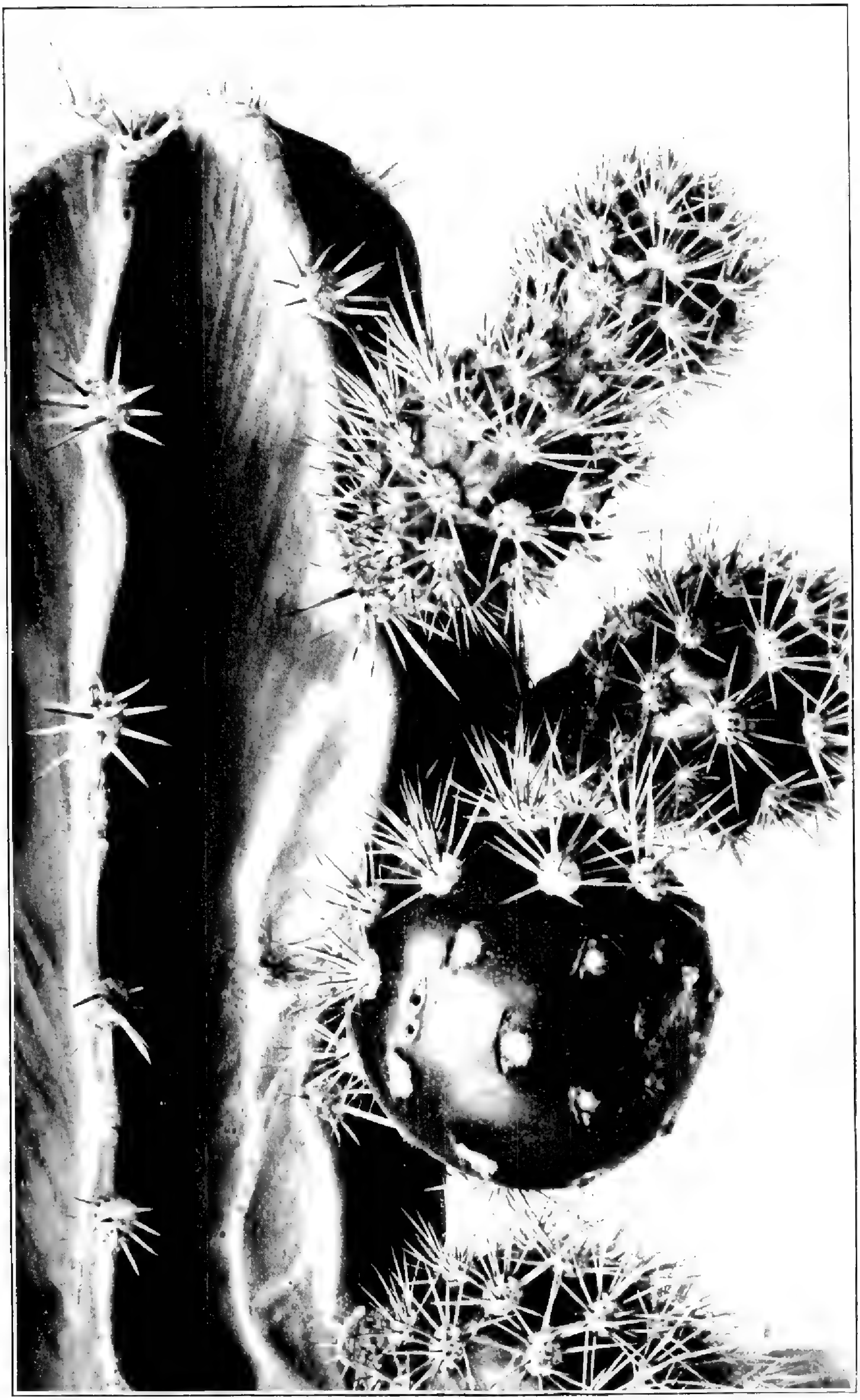
Carnegiea gigantea (Engelm.) Britt. & Rose, Journ. N. Y. Bot. Gard. **9:** 188. 1908.
Cereus giganteus Engelm. in Emory, Notes Mil. Rec. 158. 1848.
Pilocereus engelmannii Lem. Ill. Hortic. **9:** misc. 97. 1862.
Pilocereus giganteus Haage & Schmidt, Cat. 230. 1898.
TYPE LOCALITY: Along the Gila River, Arizona.
DISTRIBUTION: Arizona, southeastern California; Sonora, Mexico.
ILLUSTRATIONS: Cact. Mex. Bound. *pl. 61, 62;* Bot. Mag. *pl. 7222;* Journ. N. Y. Bot. Gard. **9:** *pls. 49, 50.*

9. LEMAIREOCEREUS gen. nov.

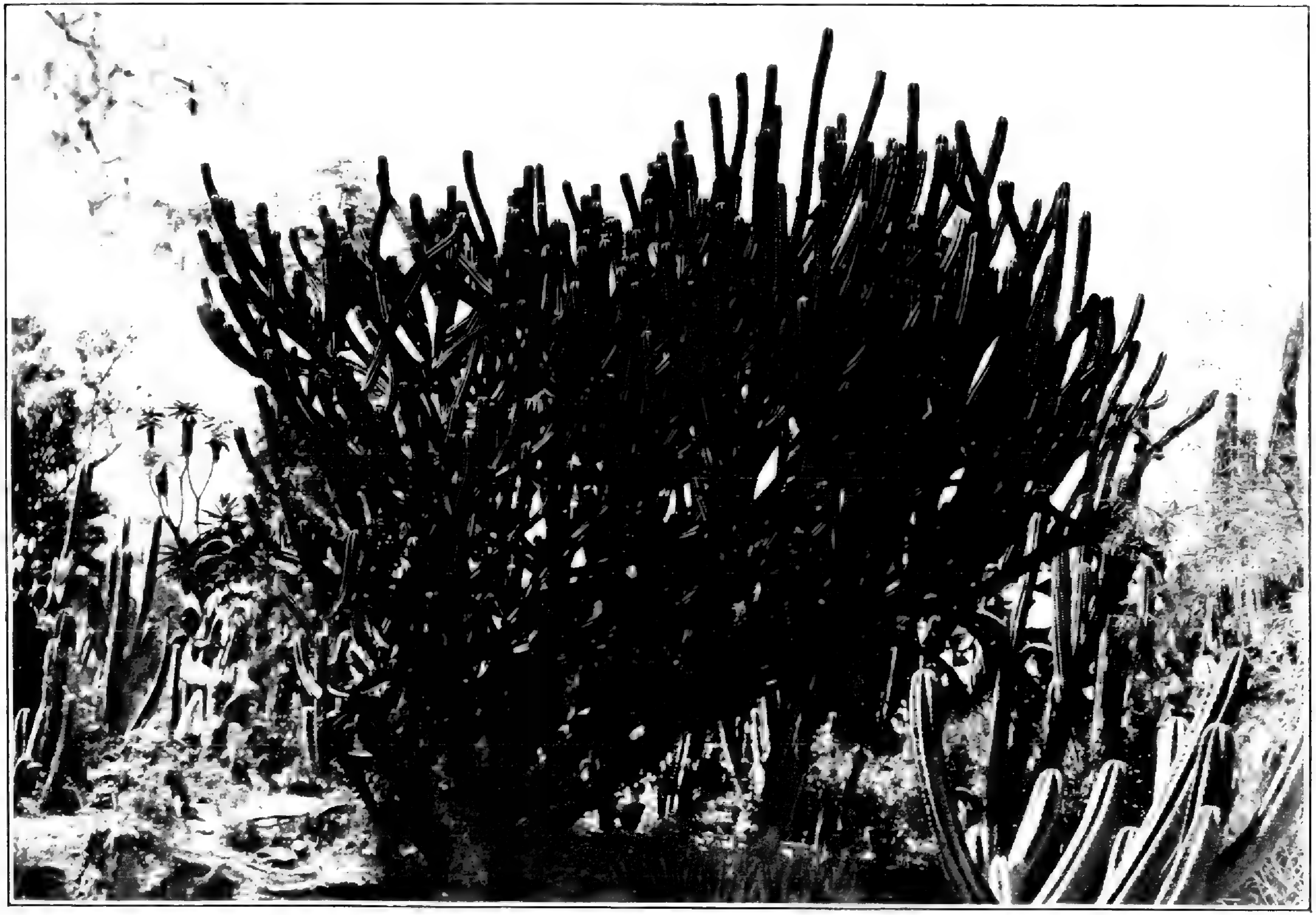
Plants usually very large, tall and branching or sometimes prostrate; spines usually stout and numerous; flowers diurnal, single at the areoles, with a more or less elongated funnelform tube; stamens numerous, borne in many rows all along the surface of the throat; surface of ovary covered with fleshy tubercles, each crowned by a small bract; axils of the bracts filled with short hairs or dense wool, at first spineless but soon developing a cluster of spines; fruit globular to oval, beset with deciduous spines, in most species, at least, irregularly bursting when old, exposing the seeds, often edible; seeds many, black.

Type species *Cereus hollianus* Weber.

Lemaireocereus cumengei (Weber).
Cereus cumengei Weber, Bull. Mus. Hist. Nat. Paris **1:** 317. 1895.
TYPE LOCALITY: Lower California.
DISTRIBUTION: Lower California.



LEMAIREOCEREUS GRISEUS (HAW.) BRITTON & ROSE.



LEMAIRLOCEREUS MIXTECENSIS (PURPUS) BRITTON & ROSE.

Lemaireocereus dumortieri (Salm-Dyck).

Cereus dumortieri Salm-Dyck, Cact. Hort. Dyck. ed. 2. 210. 1850.

? Cereus anisacanthus DC. Mem. Mus. Paris **17:** 116. 1828.

TYPE LOCALITY: Not cited.

DISTRIBUTION: Michoacan, Zacatecas, Hidalgo, and Morelos, Mexico.

Lemaireocereus eruca (Brandegee).

Cereus eruca Brandegee, Proc. Cal. Acad. II. **2:** 163. 1889.

TYPE LOCALITY: "Magdalena Island and about San Jorge," Lower California.

DISTRIBUTION: Lower California.

ILLUSTRATION: Brandegee, loc. cit. *pl. 7.*

Lemaireocereus griseus (Haw.). PLATE LXVII.

Cereus griseus Haw. Syn. Pl. Succ. 182. 1812.

Cereus eburneus Salm-Dyck, Obs. Bot. 6. 1822.

Echinocactus pruinosus Otto; Pfeiff. Enum. Cact. 54. 1837.

Cereus pruinosus Otto; Först. Handb. Cact. 398. 1846.

Cereus clavatus Otto & Dietr. Allg. Gartenz. **6:** 28. 1838.

Cereus laevigatus Salm-Dyck, Cact. Hort. Dyck. ed. 2. 204. 1850.

TYPE LOCALITY: South America.

DISTRIBUTION: Mexico to Venezuela.

EXPLANATION OF PLATE LXVII.—From a photograph taken by Mr. G. N. Collins. Scale about $\frac{1}{8}$.

Lemaireocereus gummosus (Engelm.).

Cereus gummosus Engelm.; Brandegee, Proc. Cal. Acad. II. **2:** 162. 1889.

TYPE LOCALITY: Southern Lower California.

DISTRIBUTION: Lower California.

Lemaireocereus hystrix (Salm-Dyck).

Cactus hystrix Salm-Dyck, Obs. Bot. 7. 1822.

Cereus hystrix Salm-Dyck; DC. Prod. **3:** 464. 1828.

DISTRIBUTION: Jamaica; Haiti; Cuba.

ILLUSTRATION: Journ. N. Y. Bot. Gard. **10:** *f. 20.*

Lemaireocereus hollianus (Weber).

Cereus hollianus Weber; Coult. Contr. Nat. Herb. **3:** 411. 1896.

Cereus bavosus Weber; Schum. Gesamtb. Kakteen 84. 1899.

TYPE LOCALITY: Tehuacán, Puebla, Mexico.

DISTRIBUTION: Puebla.

Lemaireocereus mixtecensis (Purpus). PLATE LXVIII.

Cereus mixtecensis Purpus, Monatssch. Kakteenk. **19:** 52. 1908.

TYPE LOCALITY: Sierra de Mixteca, Oaxaca, Mexico.

DISTRIBUTION: Puebla and Oaxaca, Mexico.

ILLUSTRATION: Purpus loc. cit. 53.

This species is perhaps nearest *Lemaireocereus stellatus.*

EXPLANATION OF PLATE LXVIII.—From a photograph taken by Dr. D. T. MacDougal.

Lemaireocereus schumanni (Mathsson).

Cereus schumanni Mathsson; Schum. Monatssch. Kakteen **9:** 131. 1899.

TYPE LOCALITY: Honduras.

DISTRIBUTION: Known only in cultivation.

Lemaireocereus stellatus (Pfeiff.). PLATE LXIX.

Cereus stellatus Pfeiff. Allg. Gartenz. **4**: 258. 1836.
Cereus dyckii Mart.; Pfeiff. Enum. Cact. 87. 1837.
Cereus tonellianus Lem. Ill. Hortic. **2**: misc. 63. 1855.
TYPE LOCALITY: Central Mexico.
DISTRIBUTION: Mexico.
ILLUSTRATION: Berger, Ann. Rep. Mo. Bot. Gard. **16**: *pl. 3. f. 1–4.*

EXPLANATION OF PLATE LXIX.—From a photograph taken by Dr. D. T. MacDougal.

Lemaireocereus thurberi (Engelm.).

Cereus thurberi Engelm. Am. Journ. Sci. II. **17**: 234. 1854.
TYPE LOCALITY: Canyon near the mountain pass of Bachuachi.
DISTRIBUTION: Sonora and Lower California.
ILLUSTRATION: Engelm. Cact. Mex. Bound. *pl. 74. f. 15.*

Lemaireocereus treleasei Rose, sp. nov. PLATE LXX.

Plants 5 to 7 meters high, simple or with a few strict branches; ribs about 20; areoles closely set, each with a peculiar V-shaped depression just above it; spines rather short, yellowish; flowers pinkish, 4 to 5 cm. long, diurnal; bracts on ovary and flower tube bearing slender whitish bristles; fruit red, about 5 cm. in diameter, covered with clusters of deciduous spines; seeds black with a dull rugose surface and a large oblique basal hilum.

Collected by J. N. Rose on the road between Mitla and Oaxaca, September 5, 1906 (no. 11300, type). The species had previously been collected by Dr. William Trelease in this same region.

Type U. S. National Herbarium no. 454090.

This species has flowers and fruit much resembling those of *Lemaireocereus stellatus*, but it has a different habit, the stems have more ribs, and it has different areoles. Mr. C. H. Thompson, of the Missouri Botanical Garden, has called my attention to the fact that this V-shaped groove is not known to occur in any of our North American species of Cereus, but is a character of several South American species.

EXPLANATION OF PLATE LXX.—From a photograph taken by Dr. D. T. MacDougal.

Lemaireocereus weberi (Coult.). PLATE LXXI.

Cereus weberi Coult. Contr. Nat. Herb. **3**: 410. 1896.
Cereus candelabrum Weber; Schum. Gesamtb. Kakteen 106. 1899.
TYPE LOCALITY: A few miles south of Tehuacán, Puebla, Mexico.
DISTRIBUTION: Puebla, Mexico.
ILLUSTRATIONS: Gesamtb. Kakteen loc. cit. *f. 24;* MacDougal, Bot. N. Am. Deserts *pl. 21.*

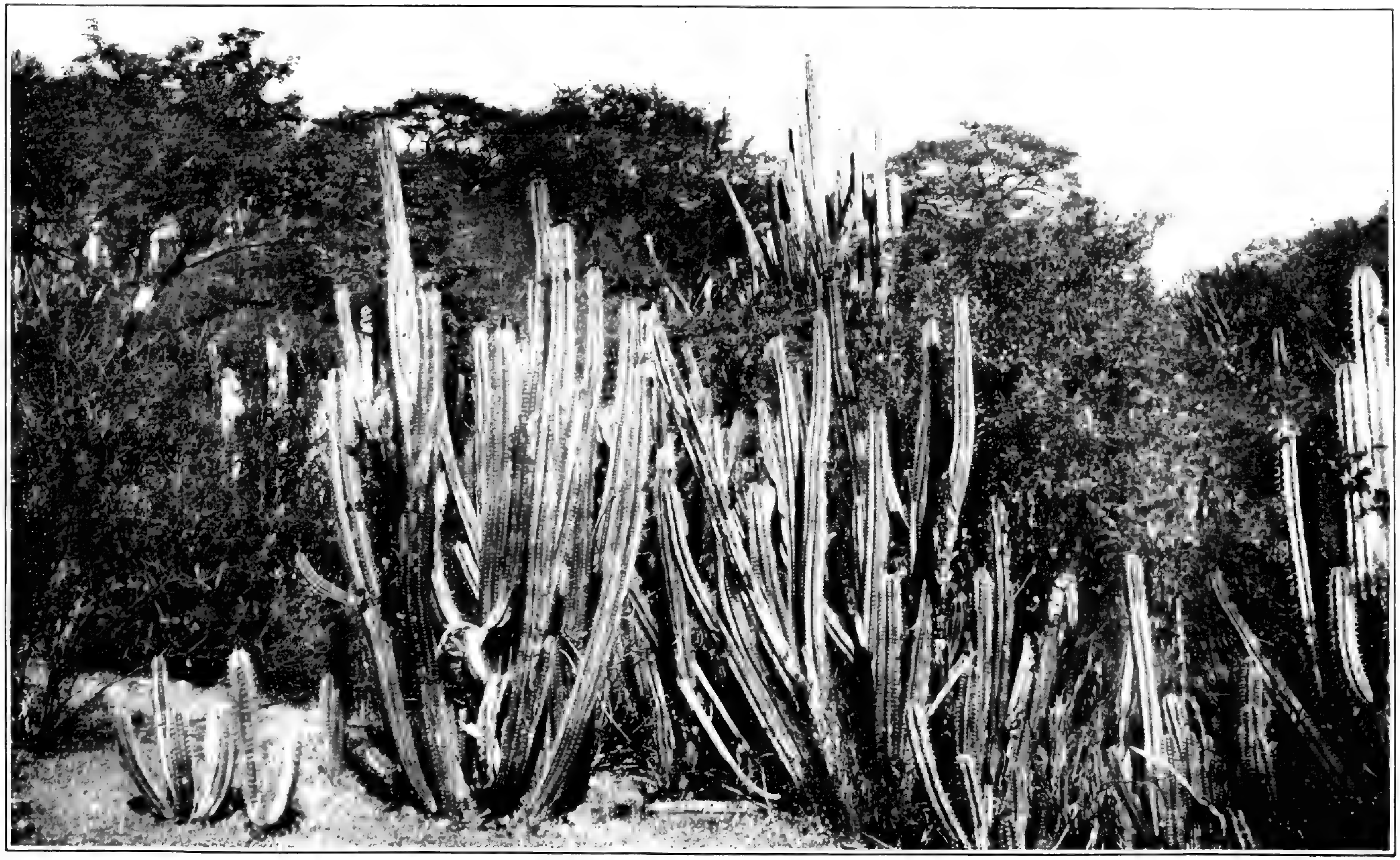
EXPLANATION OF PLATE LXXI.—From a photograph taken by Dr. D. T. MacDougal.

Near *L. griseus* belong:
CEREUS CHENDE Gosselin, Bull. Mus. Hist. Nat. Paris **11**: 506. 1903.
CEREUS CHICHIPE Gosselin, Bull. Mus. Hist. Nat. Paris **11**: 507. 1903.
See Monatssch. Kakteenk. **18**: 155. 1908.

10. **LOPHOCEREUS** gen. nov.

Plants either simple or with a few branches, or much branched at base; ribs few, areoles on the lower part of stem very different from the upper ones; flowering areoles (in the wild state) developing long bristle-like hairs standing out at right angles to the axis of the stem; flowers several from each areole, small (4 cm. or less long), funnelform with a narrow short tube; petals red; stamens short, included; fruit small, red, globular, less than 2 cm. in diameter, glabrous or with a few spines in the axils of small bracts; seeds numerous, small, black, shining, with a basal depressed hilum.

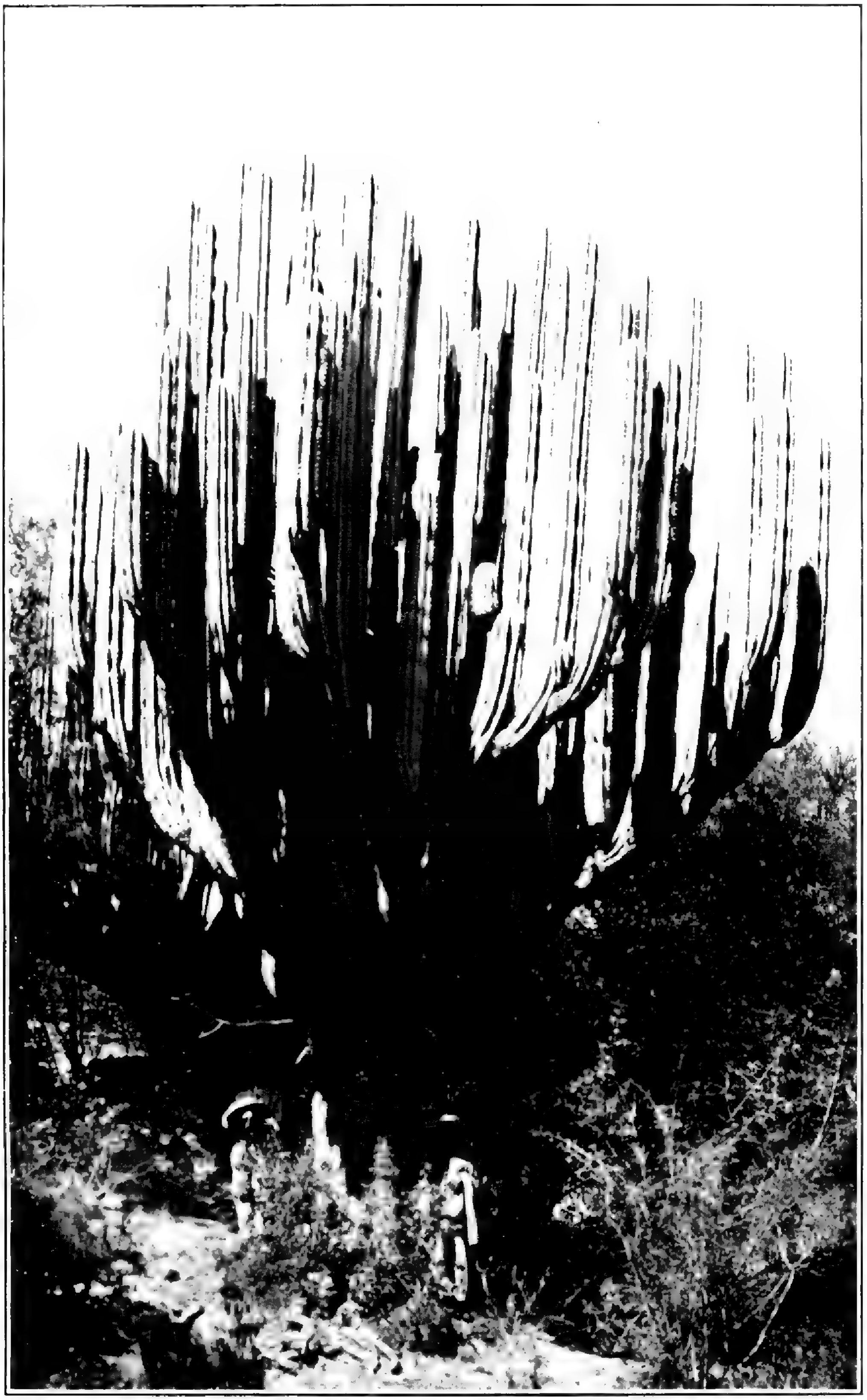
Type species *Cereus schottii* Engelm.



LEMAIREOCEREUS STELLATUS (PFEIFF.) BRITTON & ROSE.

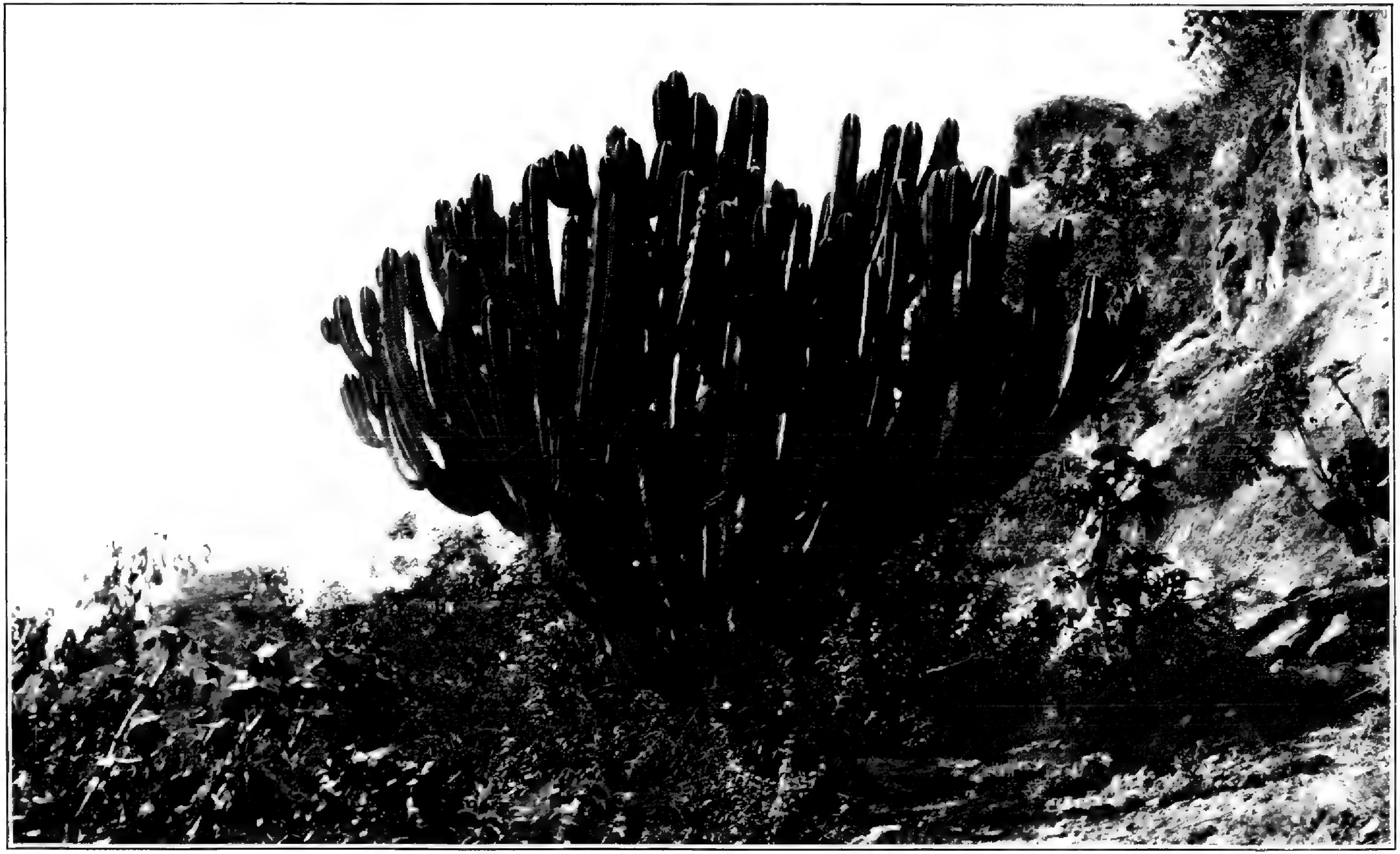
Contr. Nat. Herb., Vol. I.

LEMAIREOCEREUS TREALEASII ROSE.



LEMAIREOCEREUS WEBERI (COULT.) BRITTON & ROSE.

MYRTILLOCACTUS GEOMETRIZANS (MART.) CONSOLE.



MYRTILLOCACTUS SCHENCKII (PURPUS) BRITTON & ROSE.

Lophocereus australis (K. Brandegee).
Cereus schottii australis K. Brandegee, Zoe **5:** 4. 1900.
TYPE LOCALITY: Not cited.
DISTRIBUTION: Southern Lower California and southwestern Sonora.

Lophocereus sargentianus (Orcutt).
Cereus sargentianus Orcutt, Gard. & For. **4:** 436. 1891.
Pilocereus sargentianus Orcutt, Monatssch. Kakteenk. **2:** 76. 1892.
TYPE LOCALITY: San Quentin, Lower California.
DISTRIBUTION: Northern Lower California.
ILLUSTRATION: Orcutt, Gard. & For. loc. cit. *f. 69;* Monatssch. Kakteenk. **5:** 87.

Lophocereus schottii (Engelm.).
Cereus schottii Engelm. Proc. Am. Acad. **3:** 288. 1856.
Pilocereus schottii Lem. Rev. Hortic. **1862:** 428. 1862.
Cereus palmeri Engelm.; Coult. Contr. Nat. Herb. **3:** 401. 1896.
TYPE LOCALITY: Toward Santa Magdalena, Sonora, Mexico.
DISTRIBUTION: Sonora, Arizona, and northeastern Lower California.
ILLUSTRATIONS: Bot. Mex. Bound. *pl. 74. f. 16* (seed); Gesamtb. Kakteen *f. 37, 38.*

11. **MYRTILLOCACTUS** Console, Bull. Ort. Bot. Palermo **1:** 8. 1897.

Plants usually with a single trunk and a large much-branched top; ribs few; spines of all the areoles similar; flowers diurnal, very small, several from a single areole, with a very short tube and widely spreading petals; ovary bearing a few minute bracts, spineless; fruit a small globular edible berry; seeds small, black, with a basal hilum.

Type species *Cereus geometrizans* Mart.

Myrtillocactus cochal (Orcutt).
Cereus cochal Orcutt, West. Am. Scientist **6:** 29. 1899.
Cereus geometrizans cochal K. Brandegee, Zoe **5:** 4. 1900.
TYPE LOCALITY: Todos Santos Bay, Lower California.
DISTRIBUTION: Lower California.
ILLUSTRATION: Monatssch. Kakteenk. **5:** 74.

Myrtillocactus geometrizans (Mart.) Console, Bull. Ort. Bot. Palermo **1:** 8. 1897.
PLATE LXXII.
Cereus geometrizans Mart.; Pfeiff. Enum. Cact. 90. 1837.
Cereus pugionifer Lem. Cact. Nov. 30. 1838.
Cereus quadrangulispinis Lem.; Ehrenb. Linnaea **19:** 363. 1847, hyponym.
TYPE LOCALITY: Mexico.
DISTRIBUTION: San Luis Potosí to Oaxaca, Mexico.
ILLUSTRATIONS: Karsten, Ber. Deutsch. Bot. Gesell. **15:** *pl. 2;* Schum. Gesamtb. *f. 23.*

EXPLANATION OF PLATE LXXII.—From a photograph taken by Dr. D. T. MacDougal.

Myrtillocactus schenckii (Purpus). PLATE LXXIII.
Cereus schenckii Purpus, Monatss. Kakteenk. **19:** 38. 1909.
TYPE LOCALITY: "Sierra de Mixteca."
DISTRIBUTION: Puebla and Oaxaca, Mexico.
ILLUSTRATION: Purpus, loc. cit. 39.

EXPLANATION OF PLATE LXXIII.—From a photograph taken by Dr. D. T. MacD ugal.

12. **PENIOCEREUS** gen. nov.

Plants low, slender, erect from an enormous fleshy, turnip-shaped root, usually 4 or 5-ribbed, rarely 3 or 6-ribbed; spines of all the areoles similar; flowers very large for the size of the plant, only one from a single areole, nocturnal, white or tinged with red; tube of flower long, slender, with small clusters of spines scattered over the outer surface; fruit ovoid, long-acuminate, bright scarlet, fleshy and edible with elevated spineless areoles; seeds black, rugose, with a large oblique hilum.

Type species *Cereus greggii* Engelm.

Peniocereus was considered a subgenus of Cereus by A. Berger, whose name we have adopted.

Peniocereus greggii (Engelm.). PLATES LXXIV, LXXV.

Cereus greggii Engelm. in Wisliz. Mem. Tour North. Mex. 102. 1848.

Cereus pottsii Salm-Dyck, Cact. Hort. Dyck. ed. 2. 208. 1850.

Cereus greggii transmontanus Engelm. Proc. Am. Acad. **3**: 287. 1856.

TYPE LOCALITY: North and south of Chihuahua, Mexico.

DISTRIBUTION: Texas to Arizona; Sonora, Chihuahua, and Zacatecas, Mexico.

ILLUSTRATIONS: Engelm. Cact. Mex. Bound. *pl. 63–65;* Schum. Monatssch. Kakteenk. **5**: 150, 151; Gesamtb. Kakteen *f. 18.*

EXPLANATION OF PLATES LXXIV, LXXV.—Pl. LXXIV, A, root; B, plant in flower. Pl. LXXV, A, flowers; B, plant in flower. All from photographs taken by Francis E. Lloyd.

13. **HYLOCEREUS** gen. nov.

Climbing cacti, with elongated, 3-angled or 3-winged stems and branches emitting aerial roots, their areoles bearing several short spines and a tuft of very short wool; flowers very large, nocturnal, funnelform, the limb as long as the tube or longer; ovary and tube bearing large foliaceous scales but without spines, wool, or hairs; outer perianth segments similar to the scales of the tube, but longer; petaloid perianth segments narrow, acute or acuminate, mostly white; stamens very many, in two series equalling or shorter than the style; style cylindric, rather stout, the linear stigmas numerous; fruit with several or many persistent foliaceous scales.

Type species *Cereus triangularis* (L.) Haw.

Hylocereus was considered a subgenus of Cereus by A. Berger under this name.

Hylocereus calcaratus (Weber).

Cereus calcaratus Weber, Bull. Mus. Hist. Nat. **8**: 458. 1902.

TYPE LOCALITY: Valley of Tuis, Costa Rica.

DISTRIBUTION: Costa Rica.

This species belongs to this genus, not to Selenicereus.

Hylocereus costaricensis (Weber).

Cereus trigonus costaricensis Weber, Bull. Mus. Hist. Nat. **8**: 457. 1902.

TYPE LOCALITY: Costa Rica.

DISTRIBUTION: Costa Rica, Central America.

Older joints gray-glaucous, like those of *H. ocamponis.*

Hylocereus lemairei (Hook.).

Cereus lemairei Hook. Bot. Mag. **80**: *pl. 4814.* 1854.

TYPE LOCALITY: Thought to be Antigua.

DISTRIBUTION: Antigua, Montserrat, Culebra (?), and Porto Rico (?), Antilles.

ILLUSTRATION: Bot. Mag. loc. cit.

A

B

PENIOCEREUS GREGGII (ENGELM.) BRITTON & ROSE.

A

B

PENIOCEREUS GREGGII (ENGELM.) BRITTON & ROSE.

Hylocereus napoleonis (Graham).

Cereus napoleonis Graham, Bot. Mag. **63:** *pl. 3458.* 1836.

Cereus triangularis major Salm-Dyck, in Pfeiff. Enum Cact. 117. 1837, as synonym.

TYPE LOCALITY: Unknown; described from a cultivated plant.

DISTRIBUTION: West Indies and southern Mexico, according to Schumann.

ILLUSTRATION: Bot. Mag. loc. cit.

Hylocereus ocamponis (Salm-Dyck).

Cereus ocamponis Salm-Dyck, Cact. Hort. Dyck. ed. 2. 220. 1850.

TYPE LOCALITY: Mexico or Colombia.

DISTRIBUTION: Mexico?

Hylocereus stenopterus (Weber).

Cereus stenopterus Weber, Bull. Mus. Nat. Hist. **8:** 458. 1902.

TYPE LOCALITY: "Vallée de Tuis," Costa Rica.

DISTRIBUTION: Costa Rica, Central America.

Hylocereus triangularis (L.).

Cactus triangularis L. Sp. Pl. 468. 1753.

Cereus compressus Mill. Gard. Dict. ed. 8. no. 10. 1768.

Cereus triangularis Haw. Syn. Pl. Succ. 180. 1812.

Cereus trigonus Haw. op. cit. 181.

Cereus anizogonus Salm-Dyck, Cact. Hort. Dyck. ed. 2. 52. 1850, as synonym.

TYPE LOCALITY: "In Brasilia, Jamaica," according to Linnæus, but doubtless really Jamaica.

DISTRIBUTION: Southern Mexico to Panama; Jamaica; Cuba to Porto Rico; widely planted and escaped from cultivation in tropical America, the West Indies, and southern Florida.

ILLUSTRATIONS: Pluk. Alm. *pl. 29. f. 3;* Plumier, Pl. Am. ed. Burmann *pl. 200. f. 1, 2;* Bot. Mag. *pl. 1884;* Schum. in Mart. Fl. Bras. 4^2: *pl. 42.*

Gosselin recognizes *Cereus trigonus* as a good species.

The relative thickness of the stems is not a valid specific character in the West Indian plants of this genus.

Hylocereus tricostatus (Gosselin).

Cereus tricostatus Gosselin, Bull. Soc. Bot. France **54:** 664. 1907.

TYPE LOCALITY: Description based on plants from two localities in Mexico, viz, Huejolitlan, Puebla, and Guadalajara, Jalisco.

DISTRIBUTION: Only known from type collection.

14. **SELENICEREUS** gen. nov.

Stems slender, trailing or climbing, elongated, with low ribs, giving off roots irregularly; flowers large, often very large, nocturnal; bracts of ovary and flower tube usually bearing long hairs and bristles; fruit large, reddish, covered with clusters of deciduous spines.

Type species *Cactus grandiflorus* L.

Selenicereus was considered a subgenus of Cereus by A. Berger under this name.

Selenicereus boeckmanni (Otto).

Cereus boeckmanni Otto; Salm-Dyck, Cact. Hort. Dyck. ed. 2. 216. 1850.

Cereus eriophorus Griseb. Cat. Pl. Cub. 116. 1866, not Pfeiff. 1837.

TYPE LOCALITY: Not cited.

DISTRIBUTION: Cuba; introduced into the Bahamas.

Selenicereus coniflorus (Weingart).

Cereus coniflorus Weingart, Monatssch. Kakteenk. **14:** 118. 1904.

TYPE LOCALITY: Supposed to be Haiti.

DISTRIBUTION: Known only from plant in cultivation.

Definitely known to us only from description.

Selenicereus grandiflorus (L.).

Cactus grandiflorus L. Sp. Pl. 467. 1753.

Cereus grandiflorus Mill. Gard. Dict. ed. 8. no. 11. 1768.

TYPE LOCALITY: Jamaica; Vera Cruz.

DISTRIBUTION: Jamaica, Cuba. Widely planted in tropical America and escaped from cultivation.

ILLUSTRATIONS: Trew, Pl. Ehret. *pl. 31, 32;* DC. Pl. Grass. *pl. 52;* Bot. Rep. **8:** *pl. 508;* Bot. Mag. **62:** *pl. 3381;* Descourt. Fl. Antill. *pl. 65;* Bot. Cab. **17:** *pl. 1625;* Schum. Gesamtb. Kakteen. *f. 34.*

We accept Jamaica as the type locality.

Selenicereus hamatus (Scheidw.).

Cereus hamatus Scheidw. Allg. Gartenz. **5:** 371. 1837.

Cereus rostratus Lem. Cact. Nov. 29. 1838.

TYPE LOCALITY: Mexican.

DISTRIBUTION: Southern Mexico.

ILLUSTRATION: Schum. Gesamtb. Kakteen Nachtr. *f. 7* (fruit).

Selenicereus hondurensis (Schum.).

Cereus hondurensis Schum.; Weingart, Monatssch. Kakteenk. **14:** 147. 1904.

Cereus kunthianus Schum. Gesamtb. Kakteen Nachtr. 48. 1903, not Otto. 1850.

TYPE LOCALITY: Cultivated in Berlin Botanical Garden as from Honduras.

DISTRIBUTION: Known only in cultivation.

Selenicereus kunthianus (Otto).

Cereus kunthianus Otto; Salm-Dyck, Cact. Hort. Dyck. ed. 2. 217. 1850.

Surely not *S. macdonaldiae.*

TYPE LOCALITY: Not given.

DISTRIBUTION: Only known in cultivation. Said to have come from Honduras.

Selenicereus macdonaldiae (Hook.). PLATE LXXVI.

Cereus macdonaldiae Hook. Bot. Mag. **79:** *pl. 4707.* 1853.

TYPE LOCALITY: Honduras.

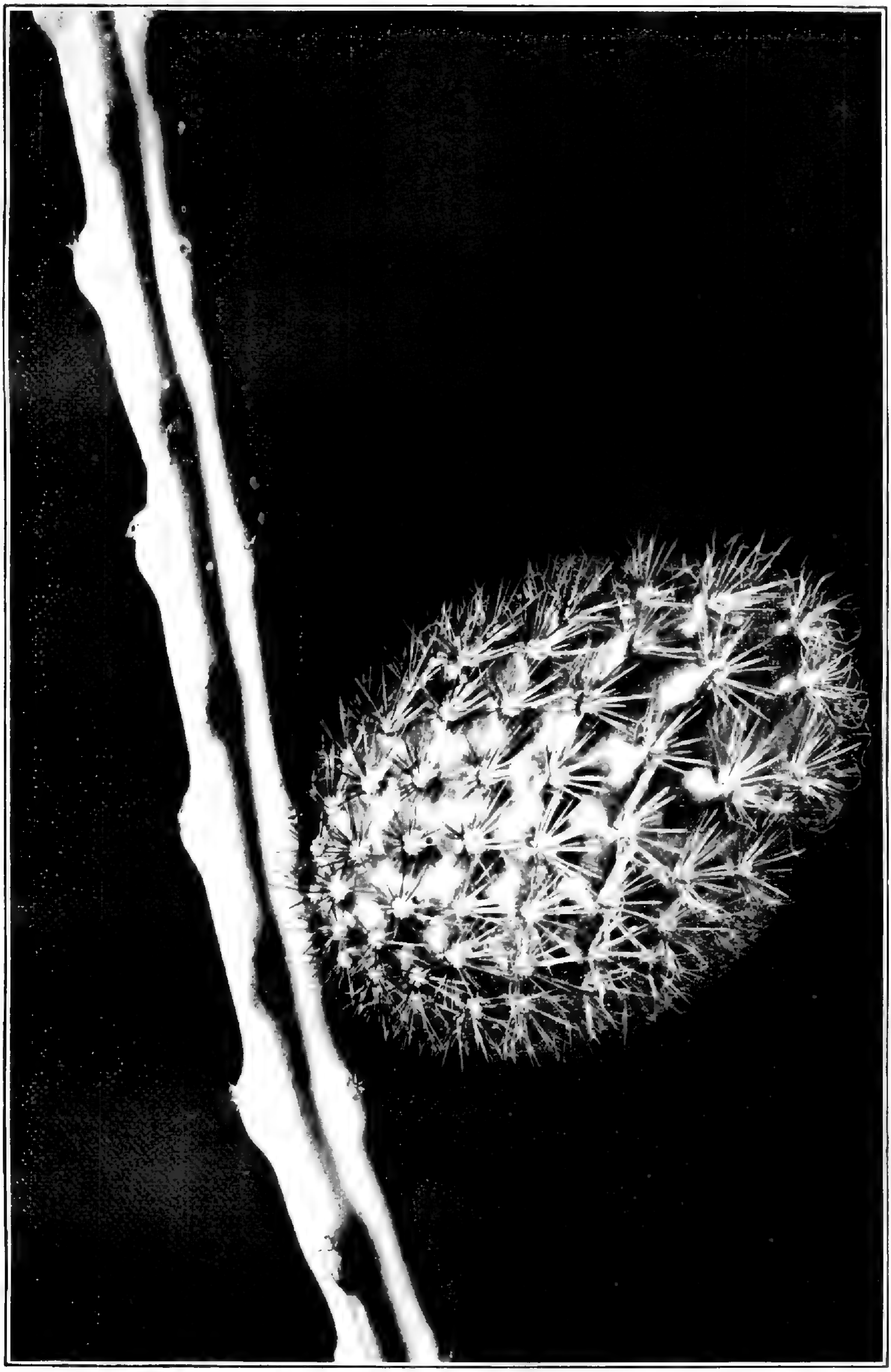
DISTRIBUTION: Honduras.

ILLUSTRATION: Bot. Mag. loc. cit.; Planch. Fl. des Serres **9:** *pl. 896, 897.*

EXPLANATION OF PLATE LXXVI.—Photograph of branch with fruit of a plant in the botanical garden at Washington. Scale $\frac{1}{8}$.

Selenicereus maxonii Rose, sp. nov.

Stems light green, but often becoming deep purple throughout, often 3 cm. in diameter; ribs 5 or 6, rather prominent but less so on the older branches; areoles small, white; spines short, yellowish; reflexed bristles or hairs from the lower part of the areoles several, white, longer than the spines; flowers nocturnal, 20 cm. long; sepals and bracts linear, greenish or brownish, sometimes nearly rose-colored; petals white, rather broad; stamens numerous; style cream-colored, stout; tube proper about 10 cm. long, bearing scattered short, linear bracts, the axils bearing short white wool and long silky white hairs and white bristles; ovary similarly clothed but with the bracts more closely set. This species has flowered twice in cultivation (April and May, 1909).



SELENICEREUS MACDONALDIAE (HOOK. BRITTON & ROSE.

Collected from the fibrous head of a palm (*Thrinax* sp.) about 8 meters high, near Berraco, 8 miles east of Daiquiri, province of Oriente, Cuba, altitude about 90 meters, by William R. Maxon (no. 4024), April 13, 1907. Specimens of this (07.330) have flowered twice in cultivation (April and May, 1909).

Type no. 535827 U. S. National Herbarium.

Selenicereus miravallensis (Weber).

Cereus miravallensis Weber, Bull. Mus. Hist. Nat. **8:** 459. 1902.

TYPE LOCALITY: Volcano of Miravalles, Costa Rica, Central America

DISTRIBUTION: Known only from the type locality.

Selinicereus pringlei Rose, sp. nov.

Stout, high climber, yellowish green, sometimes darker green or purplish, strongly ribbed; tip of stem and of leaves pinkish; ribs 6 or 7; areoles 1 to 1.5 mm. apart; spines divaricate, at first yellow, in age white, acicular; radial spines 5 or 6; central spine 1; bristles often 5, white; flowers white, about 20 cm. long; sepals elongated, linear, 3 to 4 mm. broad; petals white, shorter than the sepals, long-acuminate; wool on flower buds, in axils of bracts, and on ovary brownish.

Collected by C. G. Pringle near Jalapa, Vera Cruz, Mexico, April 3, 1899 (no. 7841, type); also obtained in the living state by J. N. Rose of J. A. McDowell in the City of Mexico, but said to have come from the State of Vera Cruz, and again by Dr. C. A. Purpus near Consoquitla, Vera Cruz. The last two specimens are now growing at Washington.

Type U. S. National Herbarium no. 342875.

Selenicereus pteranthus (Link & Otto).

Cereus pteranthus Link & Otto, Allg. Gartenz. **2:** 209. 1834.

Cereus nycticalus Link, Ver. Bef. Gartenb. **10:** 372. 1834.

Cereus brevispinulus Salm-Dyck, Hort. Dyck. 339. 1834.

TYPE LOCALITY: In Mexico.

DISTRIBUTION: Mexico.

ILLUSTRATION: Ver. Bef. Gartenb. **10:** *pl. 4.*

A common plant in conservatories.

Selenicereus spinulosus (DC.).

Cereus spinulosus DC. Mem. Mus. Paris **17:** 117. 1828.

TYPE LOCALITY: Mexico.

DISTRIBUTION: Eastern Mexico.

ILLUSTRATIONS: Blühende Kakteen *pl. 53.*

15. WEBEROCEREUS gen. nov.

Slender climbing cacti with angled stems and branches emitting aerial roots, the areoles bearing a tuft of short wool and several weak acicular bristles; flowers pink or rose-color, nocturnal, short-funnelform or funnelform-campanulate; ovary tubercled, areolate, the areoles bearing weak filiform bristles or stiff hairs, the lower part of the corolla-tube with a few similar areoles, the upper part with a few foliaceous scales; outer perianth segments reflexed-spreading, blunt, linear-oblong, the inner lanceolate, acutish or obtuse; stamens about as long as the style; stigmas few, linear; fruit "elongated, spinose, yellow" (Schumann).

Type species *Cereus tunilla* Weber.

Weberocereus biolleyi (Weber).

Rhipsalis biolleyi Weber, Bull. Mus. Nat. **8:** 467. 1902.

Cereus biolleyi Weber; Schum. Gesamtb. Kakteen Nachtr. 60. 1903.

TYPE LOCALITY: Vicinity of Port Limon, Costa Rica.

DISTRIBUTION: Costa Rica, Central America.

Weberocereus tunilla (Weber).

Cereus tunilla Weber, Bull. Mus. Hist. Nat. **8:** 460. 1902.
Cereus gonzalezii Weber, Bull. Mus. Hist. Nat. **8:** 460. 1902.
TYPE LOCALITY: Near Tablon, southwest of Cartago, Costa Rica.
DISTRIBUTION: Costa Rica, Central America.

16. WERCKLEOCEREUS gen. nov.

An elongated climbing cactus, the 3-angled or 4-angled branches emitting aerial roots, the areoles bearing short circular bristles and a tuft of very short wool; flowers nocturnal; corolla creamy-white, funnel-form, the tube nearly twice as long as the limb; ovary and corolla tube bearing many areoles each with several nearly black acicular bristles and a tuft of short black wool; outer perianth segments lanceolate, acutish, the inner broader; stamens many, bluntly pointed; style about as long as the longer stamens, with several linear stigmas; berry globose, its apex umbilicate, citron-yellow, the flesh white, the seeds shining (according to Schumann).

Type species *Cereus tonduzii* Weber.

Werckleocereus tonduzii (Weber).

Cereus tonduzii Weber, Bull. Mus. Hist. Nat. **8:** 459. 1902.
TYPE LOCALITY: Copey, near Santa Maria de Dota, Costa Rica.
DISTRIBUTION: Costa Rica, Central America.

17. ACANTHOCEREUS gen. nov.

Night-flowering cacti, with elongated, erect or reclining, 3 to 6-angled rootless stems and large funnelform flowers; areoles of the stems distant from each other, bearing a tuft of short wool and several stiff spines; ovary with several or many areoles bearing wool and spines; corolla-tube green, cylindric, slender, expanded only at the summit, bearing a few similar areoles subtended by a small scale, the limb somewhat shorter than the tube, widely expanded; sepals narrowly lanceolate, acuminate, green, shorter than the white petals; stamens shorter than the petals; style very slender, divided at the apex into several linear stigmas; berry (according to Schumann[a]) scaly and spiny, with a thick skin, red flesh, and numerous thick black seeds.

Both Schumann and Berger regard this group as consisting of a single species, while Pfeiffer recognized several. Plants cultivated in New York show great differences in the length of spines, one from Panama, collected by Cowell, having spines of the stem only 6 mm. long or less, while those from Florida and Texas have spines up to 2.5 cm. long, agreeing in this with herbarium specimens from Guadaloupe.

Type species *Cactus pentagonus* L.

Acanthocereus was considered a subgenus of Cereus by A. Berger.

Acanthocereus pentagonus (L.).

Cactus pentagonus L. Sp. Pl. 467. 1753.
Cereus pentagonus Haw.; Pfeiff. Enum. Cact. 109. 1837.
Cereus acutangulus Otto; Pfeiff. Enum. Cact. 107. 1837.
Cereus baxaniensis Karw.; Pfeiff. Enum. Cact. 109. 1837.
Cereus ramosus Karw.; Pfeiff. Enum. Cact. 108. 1837.
Cereus princeps Pfeiff. Enum. Cact. 108. 1837.
Cereus pellucidus Otto; Pfeiff. Enum. Cact. 108. 1837.
Cereus nitidus Salm-Dyck, Cact. Hort. Dyck. ed. 2. 212. 1850.
Cereus variabilis Engelm. Bost. Jour. Nat. Hist. **5:** 205. 1845, not Pfeiff. 1837.

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[a] Gesamtb. Kakteen Nachtr. 29.

Cereus vasmeri Young, Fl. Texas 276. 1873.
Cereus dussii Schum. Gesamtb. Kakteen 89. 1899.
Cereus sinul Weber; Gosselin, Bull. Mus. Paris **10:** 384. 1904.
TYPE LOCALITY: America.
DISTRIBUTION: Southern Texas, south along the coast of Mexico to Costa Rica, Central America; Florida Keys; Cuba; Guadeloupe.
ILLUSTRATION: Engelm. loc. cit. *pl. 60. f. 5, 6.*
According to Salm-Dyck[a] this is *Cactus pentagonus* L. = *Cereus pentagonus* (L.) Haw., and this view is supported by Weber.[b]

18. LEPTOCEREUS gen. nov.

Stems diffusely branching; branches slender, usually with 6 prominent thin ribs, so far as known not giving off roots; spines slender, similar; flowers diurnal(?), small; calyx tube short; stamens and style included; ovary and fruit very spiny.
Type species *Cereus assurgens* Griseb., as also of A. Berger's subgenus Leptocereus.

Leptocereus assurgens (Griseb.).
Cereus assurgens Griseb. Cat. Pl. Cub. 116. 1866.
TYPE LOCALITY: Western Cuba.
DISTRIBUTION: Cuba.
ILLUSTRATION: Schum. Gesamtb. Kakteen *f. 33;* Hartmann, loc. cit.

The following species referred to Cereus when better known may be found to belong to Leptocereus:
CEREUS QUADRICOSTATUS Bello, Ann. Soc. Espan. Hist. Nat. **10:** 276. 1881.
TYPE LOCALITY: Porto Rico.
DISTRIBUTION: Porto Rico.

19. HELIOCEREUS gen. nov.

Stems usually weak, procumbent or climbing over rocks and bushes, in cultivation often erect; branches strongly angled, giving off roots irregularly; ribs usually 3 or 4, sometimes 7; spines of all areoles similar; flowers diurnal, large for the size of the plant, only one from an areole, usually scarlet; tube short but definite; petals elongated; stamens numerous, declined; ovary spiny.
Type species *Cactus speciosus* Cav.
Heliocereus was considered a subgenus of Cereus by A. Berger, whose name we have adopted.

Heliocereus amecaensis (Heese).
Cereus amecaensis Heese; Rother, Praktischer Ratgeb. **11:** 442. 1896.
TYPE LOCALITY: Iztaccihuatl near Amecameca, Mexico.
DISTRIBUTION: Known only from the type locality.
ILLUSTRATION: Heese, loc. cit.

Heliocereus coccineus (Salm-Dyck).
Cereus coccineus Salm-Dyck; Pfeiff. Enum. Cact. 122. 1837.
TYPE LOCALITY: Mexico.
DISTRIBUTION: Mexico.
ILLUSTRATION: Pfeiff. & Otto, Abb. u. Besch. **1:** *pl. 15.*

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[a] Cact. Hort. Dyck 49.
[b] Bull. Mus. Hist. Nat. **8:** 457.

Heliocereus schrankii (Zucc.).

Cereus schrankii Zucc.; Seitz, Allg. Gartenz. **2**: 244. 1834.
TYPE LOCALITY: Mexico.
DISTRIBUTION: Mexico.
ILLUSTRATION: Pfeiff. & Otto, Abb. u. Beschr. **2**: *pl. 27.*

Heliocereus speciosus (Cav.).

Cactus speciosus Cav. Anal. Cienc. Nat. Madrid **6**: 339. 1803.
Cactus speciosissimus Desf. Mem. Mus. Paris **3**: 193. 1817.
Cereus bifrons Haw. Suppl. Pl. Succ. 76. 1819.
Cereus speciosissimus DC. Prod. **3**: 468. 1828.
Cereus speciosus Schum. in Pflanzenfam. **3**^{6a}: 179. 1894.
TYPE LOCALITY: Mexico.
DISTRIBUTION: Mexico.
ILLUSTRATIONS: Colla, Hort. Ripul. *pl. 10;* Mem. Mus. Paris loc. cit. *pl. 9,* Bot. Reg. **6**: *pl. 486;* Bot. Mag. **49**: *pl. 2306;* Herb. Amat. *pl. 391;* Bot. Cab. *pl. 924;* Reichenb. Fl. Exot. *pl. 180;* Schum. Gesamtb. Kakteen *f. 36.*

20. WILCOXIA gen. nov.

Stems usually low and weak from a cluster of fleshy roots, slender, more or less branched, the branches often only 1 cm. or less in diameter; ribs few and low; spines of all the areoles similar; flowers diurnal, large for the size of the plant, only one from an areole; tube rather short, its areoles bearing spines and wool; ovary and fruit with spines at the areoles; seeds black, the aril large, basal.

Two species from the United States and Mexico.

Type species *Cereus poselgeri* (Lem.) Coult.

The type species has been included in Echinocereus, but its habit is very unlike that of any species of that genus. The second species has been considered an anomalus Cereus. The two seem to form a well defined group and are therefore brought together under the above generic name.

The genus is named for Brig. Gen. Timothy E. Wilcox, U. S. A., retired, who has been an enthusiastic student of plants for many years.

Wilcoxia poselgeri (Lem.).

Echinocereus poselgeri Lem. Cact. 57. 1868.
Echinocereus tuberosus Rümpl; Först. Handb. Cact. ed. 2. 783. 1886.
Cereus tuberosus Poselg. Allg. Gartenz. **21**: 135. 1853, not Pfeiff. Enum. Cact. 1837.
Cereus poselgeri Coult. Contr. Nat. Herb. **3**: 398. 1896.
TYPE LOCALITY: Not given.
DISTRIBUTION: Southern Texas and Coahuila.
ILLUSTRATIONS: Engelm. Cact. Mex. Bound. *pl. 59. f. 12;* Blühende Kakteen *pl. 38.*

Wilcoxia striata (Brandegee).

Cereus striatus Brandegee, Zoe **2**: 19. 1891.
Cereus diguetii Weber, Bull. Mus. Hist. Nat. **1**: 318. 1895.
TYPE LOCALITY: "San José del Cabo," Lower California.
DISTRIBUTION: Lower California and Sonora.

21. APOROCACTUS Lem. Ill. Hortic. 7: misc. 67. 1860.

Plants slender, vine-like creeping or clambering, sending out aerial roots freely; flowers rather small, one from an areole, slender, irregular, bright red, bent above the ovary; filaments inserted near the base of the tube, somewhat exserted; fruit globose, small, reddish, setose; seeds few, reddish brown, obovate.

Type species *Cactus flagelliformis* L.

Aporocactus was considered a subgenus of Cereus by A. Berger under this name.

Aporocactus flagelliformis (L.) Lem. Ill. Hortic. **7**: misc. 68. 1860.

Cactus flagelliformis L. Sp. Pl. 467. 1753.

Cereus flagelliformis Mill. Gard. Dict. ed. 8. no. 12. 1768.

TYPE LOCALITY: In South America.

DISTRIBUTION: Mexico. Reported from Jamaica, but not found there by recent collectors.

ILLUSTRATIONS: Trew, Pl. Ehret. *pl. 30;* Bot. Mag. **1**: *pl. 17.* DC. Pl. Grass. *pl. 127;* Baill. Hist. Pl. **9**: *f. 52, 53.*

Aporocactus flagriformis (Zucc.) Lem.

Cereus flagriformis Zucc. Cat. Cact. Monac. 1836.

TYPE LOCALITY: San Jose de l'Oro, Oaxaca.

DISTRIBUTION: Mexico.

ILLUSTRATION: Pfeiff. & Otto, Abb. u. Besch. **1**: *pl. 12.*

Aporocactus leptophis (DC.).

Cereus leptophis DC. Mem. Mus. Paris **17**: 117. 1828.

Cereus flagelliformis leptophis Schum. Gesamtb. Kakteen 143. 1899.

TYPE LOCALITY: "In Mexico."

DISTRIBUTION: Mexico.

ILLUSTRATION: DC. Mem. Cact. *pl. 12.*

22. BERGEROCACTUS gen. nov.

A low, much-branched, day-blooming cactus, with spreading or ascending stout, cylindric, low-ribbed stems and branches, the areoles close together, bearing many yellow acicular radiating spines, those of contiguous areoles interlocking, one spine usually much longer than the others; corolla short-funnelform, greenish yellow, the rather widely expanding limb as long as the tube or longer; ovary densely covered with areoles bearing short brownish wool and acicular spines; corolla tube with a few similar distant areoles; sepals narrowly obovate, obtuse; petals obtuse, little longer than the stamens; style, including the linear stigmas, about as long as the stamens; fruit globose, densely spiny; seeds obovate.

Type species *Cereus emoryi* Engelm.

Bergerocereus emoryi (Engelm.).

Cereus emoryi Engelm. Am. Journ. Sci. II. **14:** 338. 1852.

Echinocereus emoryi Rümpl. Först. Handb. Cact. ed. 2. 804. 1886.

TYPE LOCALITY: "About the boundary line" of California and Lower California.

DISTRIBUTION: Southern California and Lower California.

ILLUSTRATION: Engelm. Cact. Mex. Bound. *pl. 60. f. 1–4.*

23. ECHINOCEREUS Engelm. in Wisliz. Mem. Tour North. Mex. 91. 1848.

Always low plants, erect or prostrate, single or cespitose, globular to shortly cylindric; spines on flowering and sterile areoles similar; flower large, diurnal; corolla short-funnelform, scarlet or purple, rarely yellow, the tube and ovary spiny; stigmas always green; seeds black, tuberculate.

Type species *Echinocereus viridiflorus.*

Professor Schumann recognizes 38 species in this genus, but more than 125 species and varieties have been proposed. The species of this genus will be treated in a later publication.

SPECIES OF UNKNOWN GENERIC RELATIONSHIP.

Cereus aragoni Weber, Bull. Mus. Hist. Nat. **8:** 456. 1902.

TYPE LOCALITY: In Costa Rica.

DISTRIBUTION: Costa Rica, Central America.

Ovary and fruit scaly. As indicated by Berger, perhaps a Lemaireocereus.

Cereus beneckei Ehrenb. Bot. Zeit. **2:** 835. 1844.
Cereus farinosus Haage; Salm-Dyck, Allg. Gartenz. **13:** 355. 1845.
TYPE LOCALITY: Probably Mexico.
DISTRIBUTION: Central Mexico.
ILLUSTRATION: Schum. Gesamtb. Kakteen *f. 22.*
Flowers and fruit unknown.

Cereus conformis Salm-Dyck, Cact. Hort. Dyck. ed. 2. 203. 1850.
Only known from description. Collected by Ehrenberg in Mexico in 1840.

Cereus ghiesbreghtii Schum. Gesamtb. Kakteen 81. 1899.
TYPE LOCALITY: Mexico.
DISTRIBUTION: Mexico.
ILLUSTRATION: Schum. loc. cit. *f. 16.*
The plant in the New York collection looks a little like a small Cephalocereus, and Schumann's figure is not against this view.

Cereus longicaudatus Weber; Gosselin, Bull. Mus. Paris **10:** 384. 1904.
TYPE LOCALITY: Near Mesquititlan, Mexico.
Flowers and fruit undescribed.
This species is undoubtedly the same as *Cereus vagans* Brandegee. Both were published in 1904.

Cereus mamillatus Engelm.; Coult. Contr. Nat. Herb. **3:** 405. 1896.
TYPE LOCALITY: "Mountain sides, south of Moleje, Lower California."
DISTRIBUTION: Known only from the type locality.
This is probably an Echinocereus.

Cereus martianus Zucc. Flora **15:** beibl. 66. 1832.
TYPE LOCALITY: Mexico.
DISTRIBUTION: Southern Mexico.
ILLUSTRATIONS: Bot. Mag. **66:** *pl. 3768;* Berger, Ann. Rep. Mo. Bot. Gard. **16:** *pl. 12. f. 1;* Blühende Kakteen *pl. 65.*
We agree with Mr. Berger in excluding this from Aporocactus, but we do not know its fruit.

Cereus paniculatus (Lam.) DC. Prod. **3:** 366. 1828.
Cactus paniculatus Lam. Encycl. **1:** 540. 1783.
TYPE LOCALITY: Santo Domingo.
ILLUSTRATION: Plumier, Pl. Am. ed. Burmann *pl. 192.*
Not referred by Schumann. Illustrated and described as a 4-angled upright species.

Cereus plumieri Gosselin, Bull. Soc. Bot. France **54:** 668. 1907.
Cereus napoleonis Pfeiff. Enum. Cact. 117. 1837, not Graham. 1836.
TYPE LOCALITY: West Indies.
DISTRIBUTION: West Indies.
ILLUSTRATIONS: Plumier, Pl. Am. ed. Burmann *pl. 199. fig. 2.*
Perhaps an Acanthocereus.

Cereus repandus (L.) Haw. Syn. Pl. Succ. 183. 1812, not Mill. 1768.
Cactus repandus L. Sp. Pl. 467. 1753.
TYPE LOCALITY: Curaçao [South America] (according to L. Hort. Cliff.).
From description clearly a Cephalocereus. Willdenow[a] refers to this a Jamaica species, which is doubtfully correct. The plant taken by Schumann as *C. repandus* is Harrisia. Until plants can be had from Curaçao, this species must remain doubtful.

[a] Sp. Pl. **2:** 940.

Cereus rigidissimus Muhlenpf. Allg. Gartenz. **16:** 12. 1842, not Lem. 1840.
Said to have come from Mexico, but we know it only from description.

Cereus testudo.
This is a plant recently collected by Dr. C. A. Purpus in the State of Vera Cruz, Mexico. It is said[a] to be a parasitic species, in habit resembling *C. wittii*, but the material in our possession does not enable us to determine its relationship. As far as we can learn, it has not been formally published.

Cereus vagans K. Brandegee, Zoe **5:** 191. 1904.
TYPE LOCALITY: Mazatlan, Mexico.

Cereus viperinus Weber; Gosselin, Bull. Mus. Paris **10:** 385. 1904.
TYPE LOCALITY: Zapotitlan, Mexico.

Cereus weingartianus Hartm. Monatssch. Kakteenk. **14:** 155. 1904.
TYPE LOCALITY: Hayti.
DISTRIBUTION: Known only from the type plant.
Flowers and fruit unknown.

Cereus wercklei Weber, Bull. Mus. Hist. Nat. **8:** 460. 1902.
TYPE LOCALITY: Cerro Mogote, near Miravalles, Costa Rica.
DISTRIBUTION: Known only from the type locality.

Pilocereus albisetosus (Haw) Schum. Gesamtb. Kakteen 196. 1899.
Cereus albisetosus Haw. Suppl. Pl. Succ. 77. 1819.
TYPE LOCALITY: "Domingo."
Described as a trailing, white-spined, 5-angled species. Evidently not a Cephalocereus.

Pilocereus fimbriatus (Lam.) Lem. Rev. Hortic. **1862:** 427. 1862.
Cactus fimbriatus Lam. Encycl. **1:** 539. 1783.
Cereus fimbriatus DC. Prod. **3:** 464. 1828.
Cereus serruliflorus Haw. Phil. Mag. **1830:** 109. 1830.
TYPE LOCALITY: Santo Domingo.
DISTRIBUTION: Santo Domingo.
ILLUSTRATION: Plumier, Pl. Am. ed. Burmann *pl. 195. f. 1.*
Although admitted to Pilocereus by Lemaire, the form of the flower as shown in the illustration, as also the serrate inner petals, does not make this disposition of it satisfactory, although the style is exserted. The spines are said to be "setaceous" and the illustration shows them so.

Pilocereus grandispinus (Haw.) Lem. Rev. Hortic. **1862:** 427. 1862.
Cereus grandispinus Haw. Phil. Mag. **1830:** 109. 1830.
TYPE LOCALITY: Santo Domingo.
DISTRIBUTION: Santo Domingo.
ILLUSTRATION: Plumier, Pl. Am. ed. Burmann *pl. 195. f. 2;* Descourt. Fl. Antill. *pl. 419,* as *Cactus fimbriatus.*
Not a Cephalocereus.

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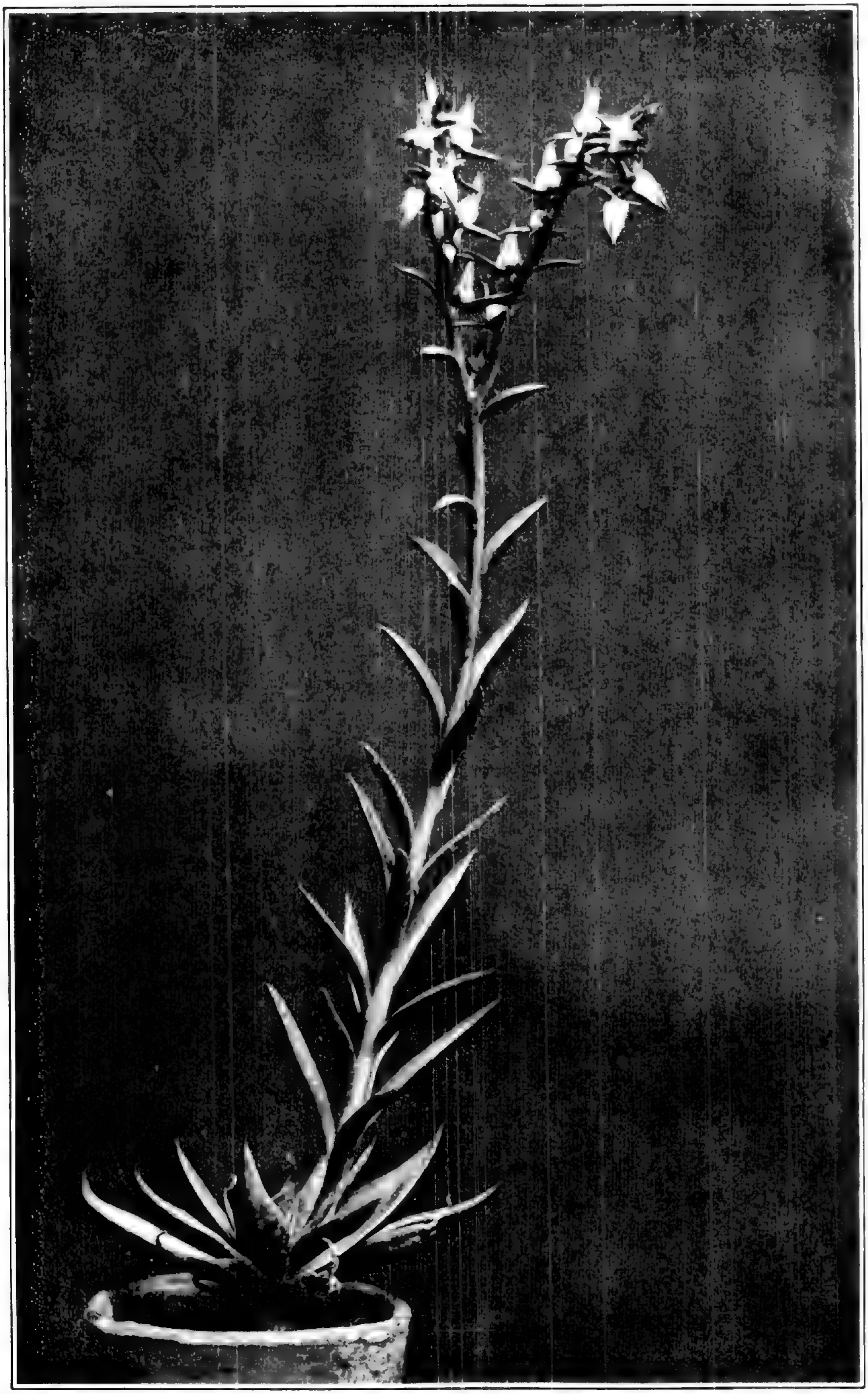
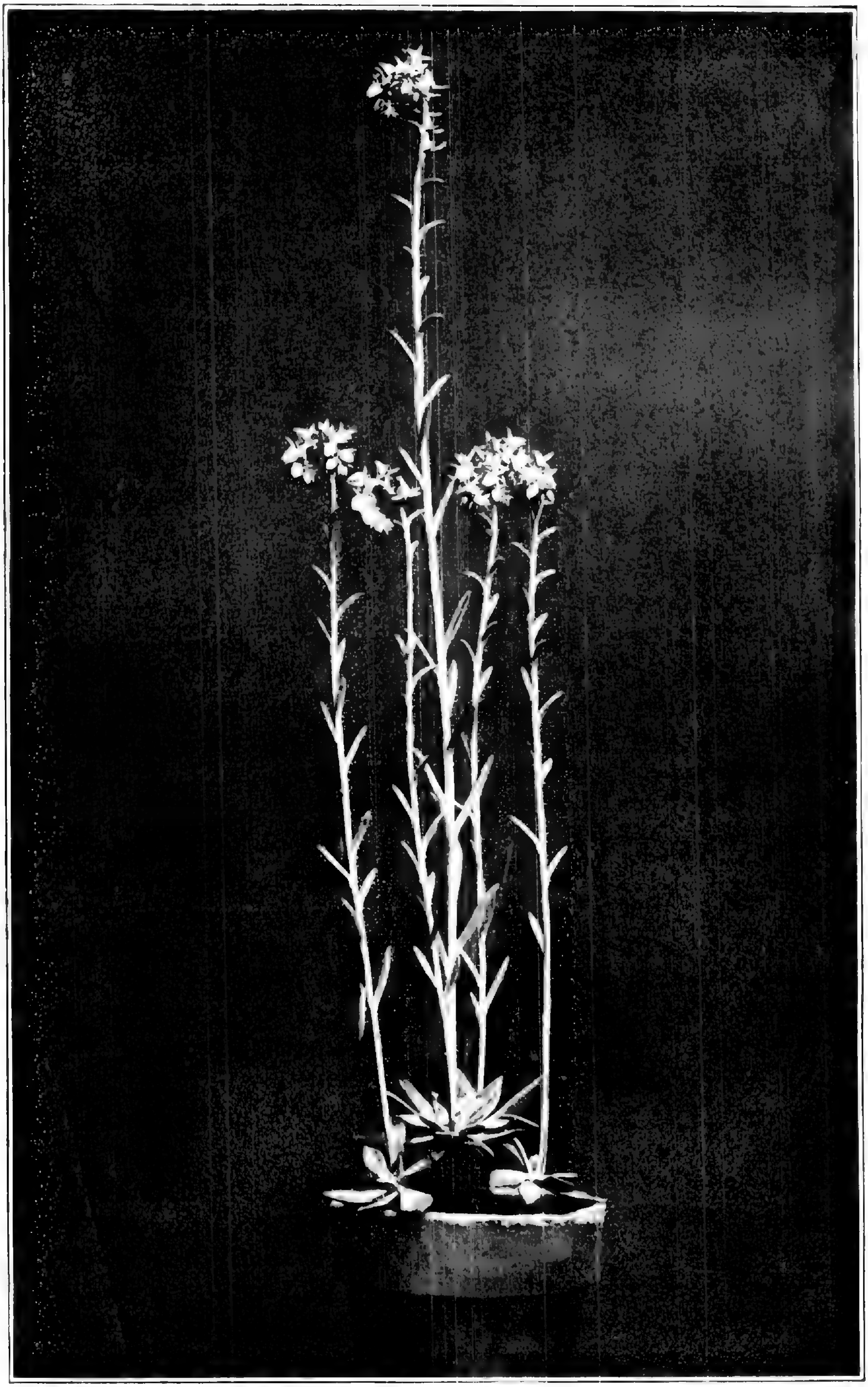
[a] Monatsschr. Kakteenk. **18:** 15. 1908.



ECHEVERIA BIFURCATA ROSE.



ECHEVERIA TRIANTHINA ROSE

FIVE NEW SPECIES OF CRASSULACEAE FROM MEXICO.

By J. N. Rose.

No other group of flowering plants make in general such unsatisfactory herbarium specimens as do the Crassulaceae when treated in the usual way. In some species the stem leaves drop off easily, and in nearly all they will gradually detach themselves unless specially treated. Some species will grow in the herbarium for months, taking on abnormal shapes and gradually becoming dismembered. In nearly every case it is best to prepare herbarium specimens by plunging the entire plant or its parts into boiling water, in some cases allowing the material to remain several minutes. In this way the tissues are killed and the plant dries readily. By this treatment, however, the shape of the leaves is destroyed, and in the case of the thick terete leaves some very important characters are lost. Indeed, it seems almost impossible to identify some of the older species even with the type in hand. Owing to the great number of species recently described from Mexico, and the indications that many more are to be described, it seems highly desirable that the habit and foliage especially should be shown either by photographs or by drawings. In my own work I shall try in the future to photograph all new species which are described from living material.

The present paper contains descriptions of some miscellaneous new species, all of which are accompanied by full-page illustrations.

Echeveria bifurcata Rose, sp. nov. PLATE LXXVII.

Caulescent, usually forming a simple rosette of leaves; basal leaves lanceolate, acuminate, rather bright green, apparently never coloring very much, 5 to 7 cm. long, 10 to 15 mm. broad, deeply concave on the face; flowering stem 20 cm. long, leafy to the base, the leaves green and not at all glaucous, semiterete, acute, 3 to 5 cm. long; inflorescence 2-branched, each branch a secund raceme 8 to 12 cm. long; pedicels almost wanting; sepals spreading at right angles to the corolla, very unequal, acute; corolla 10 to 12 mm. long, bright red above, paler below.

Collected by J. N. Rose near Ixmiquilpan, Hidalgo, July, 1905, and flowered in Washington in July, 1906.

Type U. S. National Herbarium no. 454971.

EXPLANATION OF PLATE LXXVII.—From a photograph of a greenhouse plant. Scale ½.

Echeveria trianthina Rose, sp. nov. PLATE LXXVIII.

Acaulescent, giving off rosettes freely; basal leaves numerous, deep purple and mucronate when young, becoming greenish and losing the mucro, oblanceolate, 6 to 12 cm. long, 10 to 18 mm. broad, very thick, rounded below, concave above;

flowering stem 30 to 40 cm. long, naked below; stem leaves narrow, terete or semi-terete, acute, 2 to 8 cm. long, erect or ascending; inflorescence at first strongly reflexed, usually 2-branched near the top, rarely 3-branched or simple, the branches 8 to 10 cm. long; pedicels very short, 2 to 3 mm. long, only a little elongating in age; sepals unequal, deflexed in anthesis, but later spreading at right angles to the corolla, terete, acute; corolla buds ovate, acute; corolla pink; carpels distinct.

Described from specimens sent by Dr. C. A. Purpus from the Rio de Tolantango, Hidalgo, in 1904, which flowered in Washington November, 1905.

Type U. S. National Herbarium no. 399673.

EXPLANATION OF PLATE LXXVIII.—From photograph of a greenhouse plant. Scale $\frac{7}{15}$.

Sedum allantoides Rose, sp. nov. PLATE LXXIX.

Perennial, perhaps in native state woody at base, somewhat branching below, 20 to 30 cm. high, rather weak, sometimes reclining below; leaves closely set, above somewhat scattered, standing almost at right angles to the stem, alternating, very turgid, terete in cross-section, clavate or somewhat bowed, 20 to 45 mm. long, 8 to 12 mm. in diameter, rounded at apex, somewhat narrowed at base, very pale and glaucous; branches terminating in panicles, the lower subdivisions of these axillary, their flowers in small cymes; calyx deeply cleft; sepals nearly equal, ovate, acute, widely spreading, 6 mm. long; petals widely spreading, 7 to 8 mm. long, lanceolate, acute, greenish white, sometimes tinged with pink; stamens 10; anthers pink; scale large, white, notched; ovaries 5, erect, white; styles rather short.

Collected by Dr. C. A. Purpus on hills near San Luis, Oaxaca, altitude 2,100 to 2,400 meters, in 1907 (no. 417) and flowered in Washington in January, 1909.

Type U. S. National Herbarium no. 574992.

EXPLANATION OF PLATE LXXIX.—From a photograph of a greenhouse plant. Scale $\frac{7}{15}$.

Sedum compressum Rose, sp. nov. PLATE LXXX.

Perennial, more or less prostrate and rooting at the nodes, the flowering branches erect or ascending, glabrous; leaves closely set, spreading at right angles to the stem, glabrous, glaucous, flat, spatulate to oblanceolate, 2.5 to 3 cm. long, 10 to 12 mm. broad, with an ovate, acute tip; inflorescence cymose, consisting of 2 or 3 secund racemes; calyx cleft nearly or quite to the base, the lobes ovate to lanceolate, somewhat unequal; corolla bright yellow; petals distinct, spreading, 7 to 8 mm. long, lanceolate, acute; stamens 10, the 5 alternating with the petals distinct, the other 5 borne on the base of the subtending petals; scale small, flat; carpels at first erect with long attenuate tips.

Collected by Dr. E. Palmer in a canyon near Victoria, Tamaulipas, April, 1907, and flowered in Washington, November 20, 1907, January, 1909.

Type U. S. National Herbarium no. 573870.

The species closely resembles *Sedum palmeri* but I have grown the two species together and find that they are easily distinguished. *S. compressum* flowered somewhat earlier; the leaves are smaller and have a very decided acute tip.

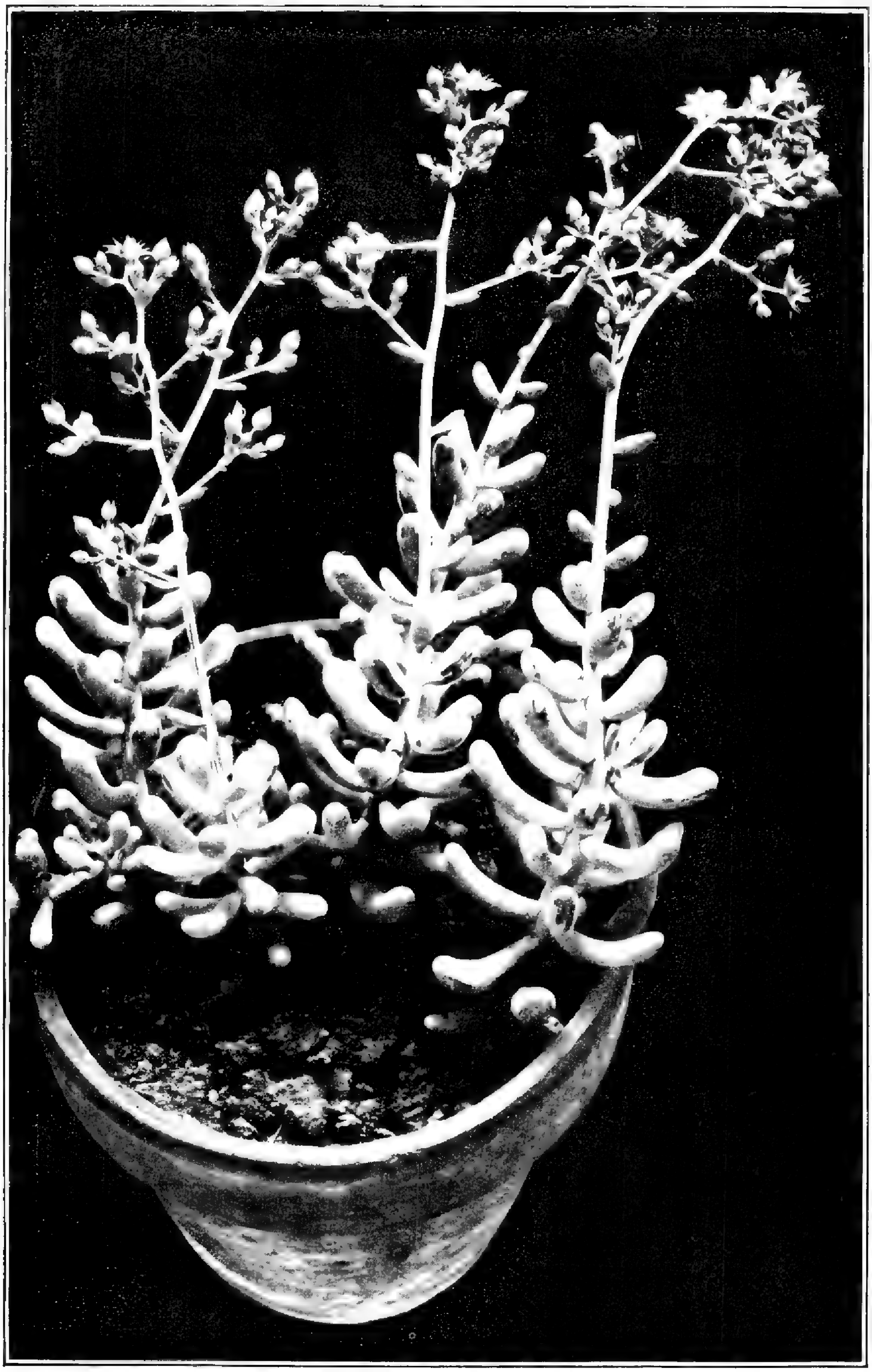
EXPLANATION OF PLATE LXXX.—From a photograph of a greenhouse plant. Scale $\frac{7}{15}$.

Villadia levis Rose, sp. nov. PLATE LXXXI.

Stems usually erect, 30 to 50 cm. high, more or less branched, glabrous; leaves narrow, nearly terete, 2 to 3 cm. long, acute, spreading, often forming small rosettes along the lower part of the stem, and there somewhat angled; inflorescence an elongated leafy spike; sepals thick, ovate; corolla buds strongly angled, the angles granulate-roughened: corolla spreading, yellowish brown, the lobes ovate; scales large, orange-colored; style branches slender.

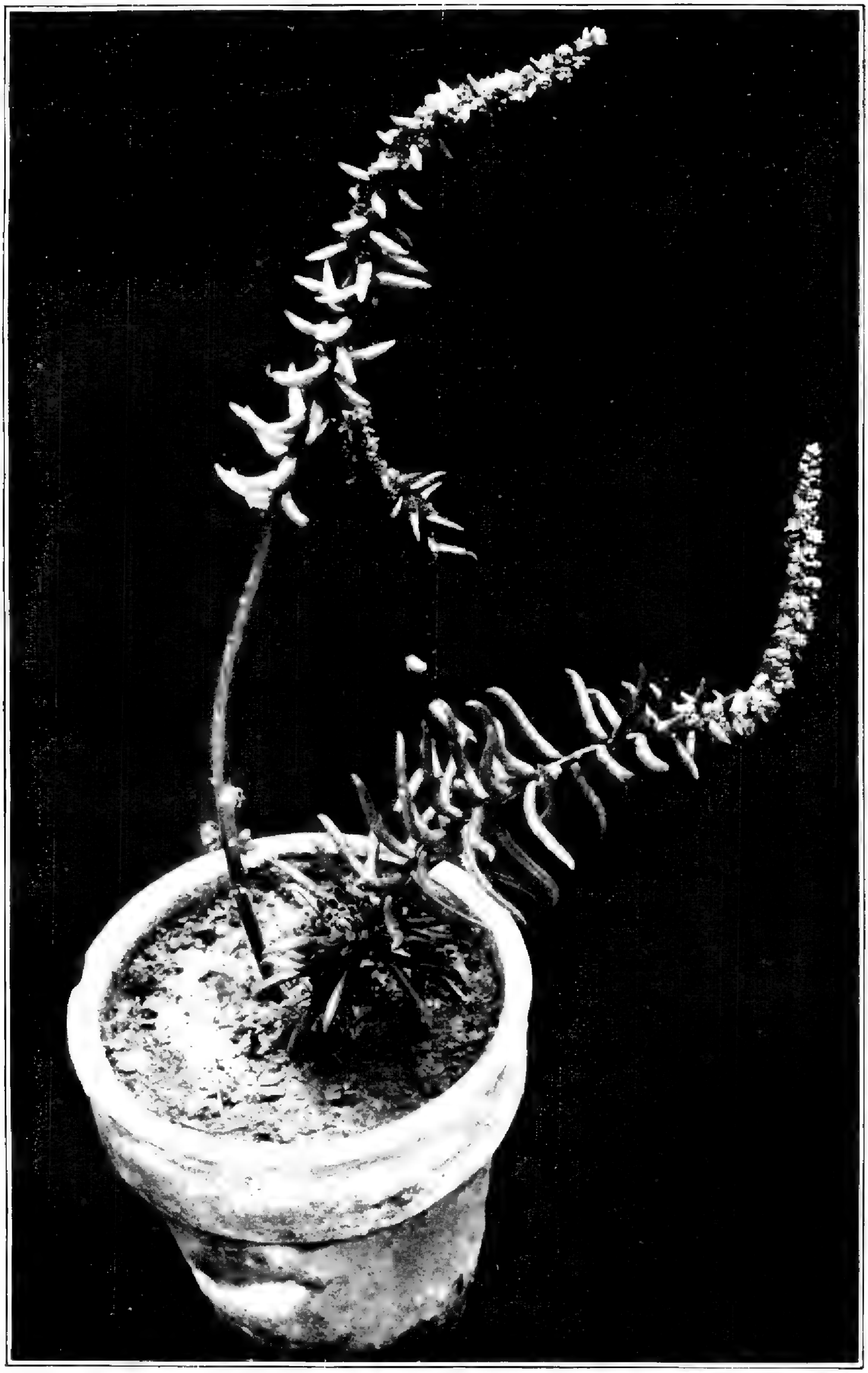
Collected by J. N. Rose near Santa Catarina, Oaxaca, September 7, 1906, (no. 11365) and flowered in Washington in 1908 and 1909.

EXPLANATION OF PLATE LXXXI.—From a photograph of a greenhouse plant. Scale $\frac{7}{15}$.



SEDUM ALLANTOIDES ROSE.

SEDUM COMPRESSUM ROSE.



VILLADIA LEVIS ROSE.

SUPPLEMENT TO THE MONOGRAPH OF THE NORTH AMERICAN UMBELLIFERAE.[a]

By John M. Coulter and J. N. Rose.

INTRODUCTION.

In 1888 we published the Revision of this family, and in 1900 our Monograph appeared. Since the latter publication enough material has accumulated to justify a short Supplement. It is to be remembered that the area covered is North America north of Mexico. This Supplement includes a record of all new species described since 1900 and of all transfers made by others which have seemed to us justifiable; descriptions of two new genera and six new species; the entry of a well-established introduced species; certain transfers which have seemed to us necessary; and a bibliography for the period since 1900. We have not included all changes that have been proposed, either because our material does not warrant an opinion, or because they do not seem to us to be justified. It is to be understood, therefore, that we have made no changes in the names used in the Monograph except as they are indicated in this Supplement.

BIBLIOGRAPHY.

The following citations include all publications of new species and varieties, within our range, since the appearance of the Monograph; and also the transfers from one genus to another in so far as they seem to us to be justified:

Blankinship, J. W. Mont. Agric. Coll. Sci. Studies **1:** 89–94. 1906. Six species.
Bush, B. F. Trans. Acad. Sci. St. Louis **12:** 57–63. 1902. Three species.
Elmer, A. D. E. Bot. Gaz. **41:** 312. 1906. One species.
Jones, Marcus E. Contributions to Western Botany **12:** 16–42. 1908. One hundred species.
Mackenzie, Kenneth K. Torreya **3:** 158, 159. 1903. One species.
Nelson, Aven. Bull. Torr. Club **28:** 223–227. 1901. Four species.
Osterhout, George E. Bull. Torr. Club. **30:** 236. 1903. One species.
Osterhout, George E. Bull. Torr. Club. **31:** 358. 1904. One species.
Osterhout, George E. Muhlenbergia **5:** 36. 1909. One species.

[a] The family name Apiaceae has been in general use in the Contributions, but we have retained the name Umbelliferae on account of the relation of this paper to the two preceding ones. Under the Vienna rules, it is made an exception to the rule for the formation of family names.

PIPER, C. V. Bull. Torr. Club **29**: 223, 224. 1902. Two varieties.
PIPER, C. V. Contr. Nat. Herb. **11**: 423. 1906. One species.
ROSE, J. N. Proc. U. S. Nat. Mus. **29**: 441, 442. 1905. One species.
ROSE, J. N. Proc. Biol. Soc. Wash. **19**: 96. 1906. One species.
RYDBERG, P. A. Mem. N. Y. Bot. Gard. **1**: 284–293. 1900. Two species.
RYDBERG, P. A. Bull. Torr. Club **31**: 573–575. 1904. Four species.
RYDBERG, P. A. Bull. Torr. Club **33**: 147. 1906. Three species.
SMALL, J. K. Fl. Southeast. U. S. 856–876. 1903. Three species.
SUKSDORF, W. N. Allg. Bot. Zeitsch. **12**: 5, 6. 1906. Two species.

GENERA AND SPECIES.

HYDROCOTYLE L. Sp. Pl. 234. 1753.

Hydrocotyle rotundifolia Roxb. Hort. Beng. 21. 1814.

This species is native of Tropical Asia and Africa. It is grown in many places as a carpet plant under the name of *Sibthorpia europea* and is now an escape in a few places in this country. It was observed a number of years ago by J. N. Rose in Washington, where it now appears every year in the grounds about the National Museum; again in lawns in West Chester, Pennsylvania, by F. Wendle; and more recently at Louisville, Kentucky, by H. Garman, who states that it is a pest in a cemetery there. For further comment see Bailey's Cyclopedia of American Horticulture.

ERYNGIUM L. Sp. Pl. 232. 1753.

Dr. J. K. Small has described the following species, which is closely related to *E. diffusum:*

Eryngium compactum Small, Fl. Southeast. U. S. 863. 1903.

SANICULA L. Sp. Pl. 235. 1753.

Sanicula serpentina Elmer, Bot. Gaz. **41**: 312. 1906.

We have not seen this species, which comes from California.

Sanicula tripartita Suksdorf, Allg. Bot. Zeit. **12**: 5. 1906.

We have not seen this species, which comes from Washington.

CHAEROPHYLLUM L. Sp. Pl. 258. 1753.

Mr. B. F. Bush has prepared a most excellent monograph of this genus, which was published in the Transactions of the Academy of Science of St. Louis.

His key to the species is as follows:

Leaves coarsely divided. Northern species.
- Fruit beaked, smooth; ribs narrow ..... 1. *C. procumbens.*
- Fruit beakless, pubescent; ribs narrow ..... 2. *C. shortii.*

Leaves finely divided. Southern species.
- Fruit beakless, smooth; ribs broad ..... 3. *C. texanum.*
- Fruit beaked, pubescent; ribs broad ..... 4. *C. dasycarpum.*
- Fruit beaked, smooth.
  - Ribs thicker than the intervals ..... 5. *C. tainturieri.*
  - Ribs narrower than the intervals.
    - Base of fruit broad, obtuse ..... 6. *C. floridanum.*
    - Base of fruit narrow, acute ..... 7. *C. reflexum.*

A new species was published by him and two varieties were raised to specific rank, as follows:

Chaerophyllum floridanum (C. & R.) Bush, Trans. Acad. Sci. St. Louis **12:** 62. 1902.

Chaerophyllum reflexum Bush, loc. cit.

Chaerophyllum shortii (T. & G.) Bush, op. cit. 59.

WASHINGTONIA Raf. Am. Month. Mag. **2:** 176. 1818.

Washingtonia longistylis villicaulis (Fernald) C. & R.
Osmorhiza longistylis villicaulis Fernald, Rhodora **10:** 52. 1908.

MUSINEON Raf. Journ. Phys. **91:** 71. 1820.

Musineon pedunculatum Nelson, Bull. Torr. Club **28:** 225. 1901.

Musineon vaginatum Rydberg, Mem. N. Y. Bot. Gard. **1:** 288. 1900.

BUPLEURUM L. Sp. Pl. 236. 1753.

Bupleurum purpureum Blankinship, Mont. Agric. Coll. Sci. Studies **1:** 89. *pl. 3.* 1905.

This species is said by Blankinship to differ from *B. americanum* in its low subacaulescent habit, shorter leaves, wider obtuse involucel bractlets, smaller heads, smaller dark purple flowers, and shorter mericarp with fewer oil tubes in the intervals, and in its alpine habitat.

ZIZIA Koch, Nov. Act. Caes. Leop. Acad. **12:** 128. 1824.

The following species of Zizia from Georgia has been described since the publication of our Monograph:

Zizia arenicola Rose, Proc. U. S. Nat. Mus. **29:** 442. 1905.

CARUM L. Sp. Pl. 263. 1753.

Carum montanum Blankinship, Mont. Agric. Coll. Sci. Studies **1:** 89. *pl. 4.* 1906.

According to Blankinship it differs from *C. gairdneri* in its larger size, larger leaves, pinnately incised leaflets, large fruit, and longer styles.

Carum garrettii A. Nelson, sp. nov.

From a fascicle of fusiform roots, 60 to 100 cm. high; stem stouter than that of *C. gairdneri;* leaves simply pinnate or the uppermost simple, on long petioles gradually dilated into the broad base; leaflets from narrowly to broadly lanceolate or oblanceolate, or even ovate, 2 to 6 cm. long, from sessile to long-petioled; bracts 1 or 2; bractlets several, small, subulate; rays 6 to 12, 2 to 4 cm. long; raylets about 20, the pedicels very slender, less than 1 cm. long; fruit ovate, about 2 mm. long; stylopodium low-conical; oil tubes very large, filling the whole interval, only two on the narrow commissure; seed terete but for the depressions below each oil tube.

All the specimens were secured by Mr. A. O. Garrett, of the Salt Lake City High School; no. 2053 (in fruit), Wasatch Mountains, Utah, September 6, 1906 (type); no. 2158 (in flower), City Creek Canyon, Utah, July 25, 1907. Mr. Garrett is growing the species in his garden and reports that it retains the characters as given above.

Type in the Rocky Mountain Herbarium, Laramie, Wyo. Photographs and fragments of type in the National Herbarium (no. 506631).

HARPERELLA Rose, Proc. Biol. Soc. Wash. **19:** 96. 1906.

HARPERIA Rose, Proc. Nat. Mus. **29:** 441. 1905, not Fitzgerald, 1904.

This genus has been described since the publication of our Monograph, and is represented by the following species from Georgia and Alabama:

Harperella nodosa Rose, Proc. Biol. Soc. Wash. **19:** 96. 1906.

ALETES C. & R. Rev. N. Am. Umbell. 27. 1888.

Aletes obovata Rydberg, Bull. Torr. Club **31:** 573. 1904.

PTILIMNIUM Raf. Am. Month. **4:** 192. 1819.

DISCOPLEURA DC. Mém. Ombell. 38. 1829.

Ptilimnium costatum. (Ell.) C. & R.

Ammi costatum Ell. Bot. S. C. & Ga. **1:** 350. 1821.

Discopleura capillacea costata DC. Mém. Ombell. 39. *pl. 8. f. B.* 1829.

Discopleura costata Chap. Fl. South. U. S. 162. 1860.

Stems stout and erect, 120 to 150 cm. high, 1 cm. in diameter, hollow, strongly fluted; leaves long-petioled, somewhat rigid, finely dissected, the segments very numerous, crowded, and appearing verticillate; peduncles short and stout, 10 cm. long or less; involucral bracts simple or deeply cleft; involucel bractlets linear, entire, short; umbels few, large; rays 4 cm. long; pedicels 7 mm. long; flowers autumnal, white; fruit ovate, 4 to 5 mm. long, the dorsal and intermediate ribs prominent; style slender, much longer than the prominent stylopodia.

"Swamps along the margin of the Ogeechee River," Georgia (type locality), and swamps near Wilmington, North Carolina.

When the Monograph was written, our only material of this form consisted of flowering specimens from G. McCarthy, collected in swamps near Wilmington, North Carolina, and attention was called to the stouter habit and the leaf characters in which it differed from *P. capillaceum.* Edwin B. Bartram has now sent us fruiting material from Wilmington which confirms Elliott's statement as to its autumnal habit and larger fruit with more prominent ribs. Mr. Bartram's letter is as follows:

> In your Monograph of the Umbelliferae I notice a reference to a species of Ptilimnium from Wilmington, North Carolina, that had not at that time been collected in good fruiting condition. While collecting in this region last fall, I noted this plant with particular interest and was fortunate in securing one head with mature fruit. The plants I observed had finely dissected, rather rigid leaves, and stout hollow stems about 1 cm. in diameter at the base and averaged about 12 dm. in height. It seems to be very distinct from *P. capillaceum* of the coastal plain, and the long recurved styles as well as the size and shape of the fruit and general habit rather suggest some specific if not generic distinction.

Ptilimnium missouriense C. & R. sp. nov.

Stems stout, 60 to 90 cm. high, somewhat fluted; leaves short-petioled, finely dissected; peduncles 16 cm. long or less; involucral bracts simple or cleft, linear or with linear lobes; involucel bractlets linear, entire; rays 10 to 35, nearly equal in each umbel, 2 to 5 cm. long; pedicels 3 to 8 mm. long; flowers autumnal, white; calyx teeth acute, prominent but shorter than the stylopodium; fruit broadly ovate, 2 to 3 mm. long; dorsal and intermediate ribs filiform; stylopodia prominent; styles long, slender.

Collected by George W. Lettermann at Allenton, Missouri, August 27, 1878 (type), and by B. F. Bush in Butler County, Missouri, October 16, 1905 (no. 3709).

Type in U. S. National Herbarium no. 140648.

This species has been distributed as *P. nuttallii,* but its very different fruit justifies our giving it specific rank.

LIGUSTICELLA EASTWOODAE C. & R.

Ptilimnium texense C. & R. sp. nov.

Stems slender, erect, 70 to 90 cm. high, somewhat branching near the top; leaves short-petioled, finely dissected, the segments numerous and filiform; peduncles slender, 10 cm. long or less; involucral bracts numerous, 3-parted, the lobes linear; involucel bractlets linear, entire; rays about 20, nearly equal, 4 cm. long; pedicels 6 to 8 mm. long; flowers autumnal, white; calyx teeth large; fruit oblong, 2 mm. long; dorsal and intermediate ribs filiform; stylopodia prominent, crowned by the short styles.

Collected by F. W. Thurow, near Hockley, Texas, September, 1890.

Type U. S. National Museum no. 41256.

A reexamination of this material has convinced us that this is a good species, combining, as stated in the Monograph, the cleft involucral bracts, characteristic fruit ribs, and shorter styles of *P. capillaceum* with the stouter habit, smaller fruit, and larger calyx teeth of *P. nuttallii*.

LIGUSTICUM L. Sp. Pl. 250. 1753.

The following species has been segregated from *L. simulans* C. & R.:[a]

Ligusticum affine A. Nelson, Bull. Torr. Club **28:** 223. 1901.

LIGUSTICELLA C. & R. gen. nov.

Calyx teeth evident; fruit ovate, flattened laterally, glabrous; carpel with filiform ribs, the laterals no more prominent than the dorsals; stylopodium conical; oil tubes 2 or 3 in the intervals, 4 on the commissural side; seed considerably broader than thick, with nearly plane face.

Low, glabrous, acaulescent perennials, with small, simply pinnate leaves, no involucre (rarely 1 or 2 caducous bracts), involucels of broad, toothed bractlets, and yellowish green flowers in few-rayed, compact umbels.

The genus is founded on *Ligusticum eastwoodae* C. & R., and differs from Ligusticum in its acaulescent habit, simply pinnate leaves, small and compact few-rayed umbels, yellowish flowers, and equal filiform ribs of the fruit. It resembles Orumbella in habit and foliage; but that genus has a conspicuous involucre, prominently ribbed fruit, and purple flowers. Furthermore, Orumbella is an Alaskan coast plant, while Ligusticella is a high alpine plant of Colorado.

Ligusticella eastwoodae C. & R. PLATE LXXXII.

Ligusticum eastwoodae C. & R. Contr. Nat. Herb. **3:** 320. *pl. 13.* 1895.

High mountains of Colorado.

EXPLANATION OF PLATE LXXXII.—Plant; *a*, fruiting umbel; *b*, dorsal view of carpel; *c*, cross section of carpel. Plant natural size; *a*, natural size; *b*, scale 5; *c*, scale 11.

ORUMBELLA C. & R. gen. nov.

Calyx teeth small, but evident; fruit shortly oblong, flattened laterally, glabrous; carpel with prominent ribs, the lateral ones slightly broader; stylopodium conical; oil tubes 2 or 3 in the intervals, 2 to 4 on the commissural side; seed with round back and plane face.

Low, glabrous, acaulescent perennials, with small, simply pinnate leaves, conspicuous involucre, involucels of narrow bractlets, and purple flowers in few-rayed umbels.

The genus is founded on *Ligusticum macounii* C. & R., and differs from Ligusticum in its acaulescent habit, simply pinnate leaves, conspicuous involucre, small few-rayed umbels, and minor differences in the fruit.

The name Orumbella refers to the coastal habitat of the plant.

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[a] Contr. U. S. Nat. Herb. **7:** 135. 1900.

Orumbella macounii C. & R.

Ligusticum macounii C. & R. Contr. Nat. Herb. **1:** 289. *pl. 23.* 1893.

Only known from Cape Vancouver, Alaska.

CONIOSELINUM Hoffm. Gen. Umb. XXVIII. 1814.

Conioselinum scopulorum (Gray) C. & R. Contr. Nat. Herb. **7:** 151. 1900.

Conioselinum coloradense Osterhout, Muhlenbergia **5:** 36. 1909.

Mr. George E. Osterhout has proposed a new species of Conioselinum which we are unable to separate from *C. scopulorum.*

ANGELICA L. Sp. Pl. 250. 1753.

Angelica dilatata A. Nelson, sp. nov.

Glabrous, one-half to one meter high; lower leaves ternate, then pinnate; the upper nearly simply pinnate, with greatly dilated petioles, sometimes the uppermost reduced to the dilated petiole or the petiole tipped with a diminutive biternate leaf; leaflets broadly obovate to ovate, glaucous beneath, nearly or quite sessile, obscurely and somewhat irregularly serrate, or rarely with a basal lobe on one side; the dilated petioles 10 to 20 cm. long, 5 to 6 cm. broad when spread out; umbel about 30-rayed, the involucre wanting or represented by 1 or 2 more or less conspicuous bracts; involucels none; rays 5 to 8 cm. long, nearly or quite glabrous; fruit oblong-elliptic, obscurely and sparsely hirsute, less than 5 mm. long; lateral wings broader than the low dorsal and intermediate ones; oil tubes solitary in all the intervals; pedicels unequal, usually much longer than the fruits.

Collected by A. O. Garrett near mountain streams in City Creek Canyon, Salt Lake City, Utah, July 25, 1907, no. 2127; fruiting specimens same station in 1908.

Most nearly allied to *A. kingii* (Wats.) C. & R., which differs in being an aquatic, with narrower leaflets, with only 5 to 10 rays, and with pedicels and fruit subequal.

Type in Rocky Mountain Herbarium, Laramie, Wyoming; fragments and photograph in U. S. National Herbarium.

PHELLOPTERUS Nutt. in Torr. & Gr. Fl. **1:** 623. 1840.

Phellopterus camporum Rydberg, Bull. Torr. Club **31:** 574. 1904.

We have not seen this species.

AULOSPERMUM C. & R. Contr. Nat. Herb. **7:** 174. 1900.

Mr. George E. Osterhout has described the two following species from Colorado:

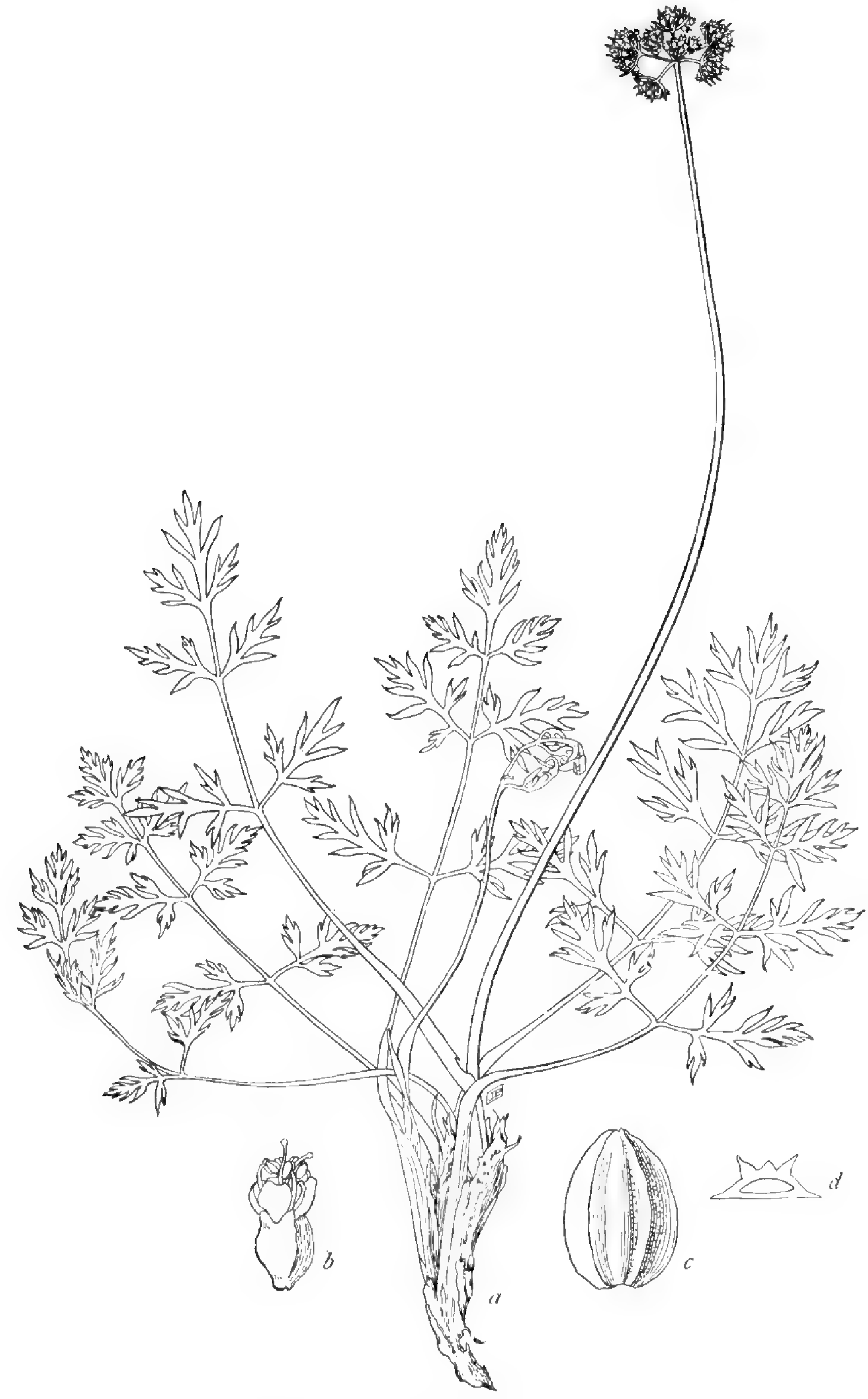
Aulospermum angustatum Osterhout, Bull. Torr. Club **31:** 358. 1904.

Aulospermum planosum Osterhout, Bull. Torr. Club **30:** 236. 1903.

CYMOPTERUS Raf. Journ. Phys. **89:** 100. 1819.

Mr. Jones[a] has merged under Cymopterus the following genera of our Monograph: Aulospermum C. & R., Oreoxis Raf., Phellopterus Nutt., Pseudocymopterus C. & R., Pteryxia Nutt., and Rhysopterus C. & R. This wholesale merging of distinct groups of species is based on a conception with which we can not sympathize. In this same spirit Otto Kuntze united Cereus and Opuntia, Aster and Solidago, etc. The taxonomic work of to-day is moving away from the idea of con-

[a] Contr. Western Bot. **12:** 16–29. 1908.



PSEUDOCYMOPTERUS TIDESTROMII C. & R.

solidating into one comprehensive and ill-defined genus a number of sharply distinguished groups. We see no reason why the genera thus merged should not continue to be recognized as defined in the Monograph.

The following new species and varieties described by Mr. Jones under Cymopterus we have had no opportunity to study:

Cymopterus aboriginum Jones, Contr. Western Bot. **12**: 22. 1908.

Cymopterus aboriginum oblongus Jones, loc. cit. 23.

Cymopterus aboriginum ovalis Jones, loc. cit. 22.

Cymopterus aboriginum subternatus Jones, loc. cit. 23.

Cymopterus basalticus Jones, loc. cit. 16.

Cymopterus humboldtensis Jones, loc. cit. 21.

Cymopterus lapidosus deserti Jones, loc. cit. 21.

Cymopterus owenensis Jones, loc. cit. 26.

PSEUDOCYMOPTERUS C. & R. Rev. N. Am. Umbell. 20. 1888.

Pseudocymopterus aletifolius Rydberg, Bull. Torr. Club **31**: 574. 1904.

Pseudocymopterus multifidus Rydb. Bull. Torr. Club **33**: 147. 1906.
Pseudocymopterus montanus multifidus Rydb. Bull. Torr. Club **31**: 574. 1904.

Pseudocymopterus purpureus (C. & R.) Rydb. Bull. Torr. Club **33**: 147. 1906.

Pseudocymopterus sylvaticus A. Nelson, Bull. Torr. Club **28**: 224. 1901.

Pseudocymopterus tenuifolius (A. Gray) Rydb. Bull. Torr. Club **33**: 147. 1906.

Pseudocymopterus tidestromii C. & R. sp. nov. PLATE LXXXIII.

Mostly acaulescent, from a multicipital caudex; leaves once pinnate, usually less than 10 cm. long; leaflets ovate to lanceolate in outline, more or less deeply incised (this sometimes resulting in a second pinnation), the ultimate lobes narrowly lanceolate to linear, sharp-pointed, the lower ones often cleft again; peduncles slender, usually less than 20 cm. long; umbel 8 to 10-rayed, with involucels of numerous conspicuous, linear (mucronately tipped) bractlets longer than the deep-yellow flowers; rays rather unequal, the longest about 10 mm. long; pedicels about 1 mm. long.

Collected by Ivan Tidestrom on slopes of Mount Terrell, Wasatch Mountains, altitude 3,075 meters, August 27, 1908, no. 1811.

Type U. S. National Herbarium no. 506215.

Nearest *P. multifidus* Rydb., but mostly acaulescent and with different leaf dissection.

EXPLANATION OF PLATE LXXXIII.—*a*, Plant; *b*, flower; *c*, dorsal view of carpel; *d*, cross section of immature carpel. *a*, Natural size; *b*, *c*, *d*, scale 6.

PLEIOTAENIA C. & R.

POLYTAENIA DC. Mém. Ombell. 53. 1829, not POLYTAENIUM Desv. Mem. Soc. Linn. Paris **6**: 218. 1827.

Mr. William R. Maxon has called our attention to the fact that the name of the Umbelliferous genus Polytaenia had been given to a genus of ferns two years before its publication by De Candolle. While some would hesitate to rename Polytaenia

simply because it is a homonym, all will admit the necessity of doing so since the Polytaenium Desv., long relegated to synonymy, should doubtless be restored.

The genus contains a single species and a variety.

Pleiotaenia nuttallii (DC.) C. & R.

Polytaenia nuttallii DC. Mém. Ombell. 54. *pl. 13*. 1829.

Pleiotaenia nuttallii texana C. & R.

Polytaenia nuttallii texana C. & R. Contr. Nat. Herb. **7**: 192. 1899.

PSEUDOTAENIDIA Mackenzie, Torreya **3**: 158. 1903.

This genus has been described since the publication of the Monograph, and is represented by the following species from the mountains of Virginia and West Virginia:

Pseudotaenidia montana Mackenzie, loc. cit. 159.

LEPTOTAENIA Nutt. in Torr. & Gr. Fl. **1**: 629. 1840.

CUSICKIA Jones, Contr. Western Bot. **12**: 39. 1908.

In the generic description published in the Monograph, the range in number of oil tubes was not changed from its original statement. The newer species showed that this range must be changed from "3 to 6 in the intervals," to read "1 to 6 in the intervals, and sometimes none (*L. anomala*)."

Mr. Jones has established a new genus Cusickia, based upon our *L. minor*. A reexamination of the genus has not shown us any more than specific differences between this species and the other species of Leptotaenia; and Mr. Jones has not called attention to the differential characters he has in mind.

COGSWELLIA Sprengel in Roem. & Schult. Syst. Veg. **6**: xlviii. 1820.

LOMATIUM Raf. in Journ. Phys. **89**: 101. 1819, not LOMATIA R. Br. 1810.

In the preparation of our Monograph the fact that Lomatium Raf. was a homonym escaped us, though made evident by Schultes's observation appended to Sprengel's description: "Nomen mutandum, cum jam sit Lomatia Rob. Brown." In consequence of this, Mr. Marcus E. Jones[a] has very properly transferred to Cogswellia most of our species of Lomatium. We append a list of the species of Cogswellia, with such modification of the list of Mr. Jones as seems to us necessary. We can not follow him, however, in the merging of Euryptera Nutt. and Cynomarathrum Nutt. under Cogswellia, for the general reason intimated under Cynopterus above.

Cogswellia alata C. & R.

Lomatium alatum C. & R. Contr. Nat. Herb. **7**: 228. 1900.

Cogswellia ambigua (Nutt.) Jones, Contr. Western Bot. **12**: 32. 1908.

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[a] Contr. Western Bot. **12**: 1908.

Cogswellia angustata C. & R.
Peucedanum martindalei angustatum C. & R. Bot. Gaz. **13:** 143. 1888.
Lomatium martindalei angustatum C. & R. Contr. Nat. Herb. **7:** 225. 1900.
Cogswellia martindalei angustata Jones, loc. cit. 34.

Cogswellia anomala Jones, loc. cit. 32.

Cogswellia argensis (Jones) C. & R.
Peucedanum argense Jones, Contr. Western Bot. **8:** 30. 1898.

Cogswellia artemisiarum (Piper) C. & R.
Lomatium macrocarpum artemisiarum Piper, Bull. Torr. Club **29:** 223. 1902.
Lomatium artemisiarum Piper, Contr. Nat. Herb. **11:** 423. 1906.

Cogswellia austinae (C. & R.) Jones, **12:** 35. 1908.

Cogswellia bicolor (S. Wats.) Jones, loc. cit. 33.

Cogswellia brecciarum Jones, loc. cit. 32

Cogswellia brevifolia (C. & R.) Jones, loc. cit. 32.

Cogswellia canbyi (C. & R.) Jones, loc. cit. 33.

Cogswellia caruifolia (Hook. & Arn.) Jones, loc. cit. 34.

Cogswellia caruifolia patens Jones, loc. cit. 34.

Cogswellia circumdata (S. Wats.) Jones, loc. cit. 33.

Cogswellia congdoni (C. & R.) Jones, loc. cit. 34.

Cogswellia cous (S. Wats.) Jones, loc. cit. 33.

Cogswellia cusickii (S. Wats.) Jones, loc. cit. 32.

Cogswellia dasycarpa (Torr. & Gr.) Jones, loc. cit. 34.

Cogswellia daucifolia (Nutt.) Jones, loc. cit. 34.

Cogswellia decipiens Jones, loc. cit. 38.

Cogswellia donnellii (C. & R.) Jones, loc. cit. 34.

Cogswellia elliptica (T. & G.) Jones, loc. cit. 33.

Cogswellia farinosa (Hook.) Jones, loc. cit. 33.

Cogswellia flava (Suksdorf) C. & R.
Lomatium flavum Suksdorf, Allg. Bot. Zeitsch. **12:** 6. 1906.
Lomatium macrocarpum semivittatum Piper, Bull. Torr. Club **29:** 224. 1902.

Cogswellia foeniculacea (Nutt.) C. & R.
Ferula foeniculacea Nutt. Gen. **1:** 183. 1816.
Cogswellia villosa Spreng. in Roem. & Schult. Syst. **6:** 588. 1820.
Lomatium foeniculaceum C. & R. Contr. Nat. Herb. **7:** 222. 1900.

Cogswellia geyeri (S. Wats.) Jones, loc. cit. 33.

Cogswellia gigantea (C. & R.) Jones, loc. cit. 32.

Cogswellia gormani (Howell) Jones, loc. cit. 33.

Cogswellia grayi C. & R.
Lomatium grayi C. & R. Contr. Nat. Herb. **7:** 229. 1900.
Cogswellia millefolia Jones, loc. cit. 35.
Peucedanum millefolium S. Wats. Bot. King Surv. 129. 1871, not Sonder, 1861–62.

Cogswellia hallii (Watson) Jones, loc. cit. 35.

Cogswellia hendersonii (C. & R.) Jones, loc. cit. 33.

Cogswellia jaredii (Eastwood) C. & R.
Peucedanum jaredii Eastwood, Zoe **5:** 88. 1900.

Cogswellia jonesii (C. & R.) Jones, loc. cit. 34.

Cogswellia juniperina Jones, loc. cit. 34.

Cogswellia laevigata (Nutt.) Jones, loc. cit. 32.

Cogswellia leibergi (C. & R.) Jones, loc. cit. 35.

Cogswellia lemmoni (C. & R.) Jones, loc. cit. 33.

Cogswellia leptocarpa (Nutt.) Jones, loc. cit. 33.

Cogswellia macdougali (C. & R.) Jones, loc. cit. 34.

Cogswellia macrocarpa (Nutt.) Jones, loc. cit. 33.

Cogswellia marginata (Benth.) Jones, loc. cit. 35.

Cogswellia martindalei (C. & R.) Jones, loc. cit. 34.

Cogswellia microcarpa (Howell) Jones, loc. cit. 35.

Cogswellia mohavensis (C. & R.) Jones, loc. cit. 34.

Cogswellia montana (C. & R.) Jones, loc. cit. 34.

Cogswellia nevadensis (S. Wats.) Jones, loc. cit. 33.

Cogswellia nevadensis cupulata Jones, loc. cit. 33.

Cogswellia nevadensis pseudorientalis Jones, loc. cit. 37.

Cogswellia nudicaulis (Pursh) Jones, loc. cit. 31.

Cogswellia oregana (C. & R.) Jones, loc. cit. 35.

Cogswellia orientalis (C. & R.) Jones, loc. cit. 33.

Cogswellia parishii C. & R.
Lomatium parishii C. & R. Contr. Nat. Herb. **7:** 235. 1900.
Cogswellia nevadensis parishii (C. & R.) Jones, loc. cit. 33.

Cogswellia piperi (C. & R.) Jones, loc. cit. 33.

Cogswellia platycarpa (Torr.) Jones, loc. cit. 32.

Cogswellia platyphylla C. & R.
Peucedanum latifolium Nutt. in Torr. & Gr. Fl. **1:** 625. 1840, not DC. 1830.
Cogswellia latifolia Jones, loc. cit. 31.
Lomatium platyphyllum C. & R. Contr. Nat. Herb. **7:** 238. 1900.

Cogswellia plummerae (C. & R.) Jones, loc. cit. 34.

Cogswellia robustior C. & R.
Lomatium robustius C. & R. Contr. Nat. Herb. **7:** 228. 1900.
Cogswellia triternata robustior Jones, loc. cit. 32.

Cogswellia sandbergii (C. & R.) Jones, loc. cit. 35.

Cogswellia serpentina Jones, loc. cit. 42.

Cogswellia simulans C. & R. sp. nov.

Caulescent, 30 to 40 cm. high, more or less tomentose, leaves twice-ternate, then pinnately compound; ultimate segments linear-oblong, apiculate, strongly nerved; umbel 6 to 8-rayed, the rays becoming equal, with conspicuous involucels of lanceolate, acute, scarious-margined bractlets; rays 4 to 6 cm. long; flowering pedicels very short, fruiting ones 5 to 7 mm. long; flowers lilac; calyx teeth evident, green; ovary floccose-pubescent; fruit oblong, somewhat pubescent, 15 to 17 mm. long, 7 to 8 mm. broad, with wings about as broad as body, and filiform dorsal and intermediate ribs; oil tubes very indistinct; seed and carpel very much flattened.

Collected by J. W. Congdon, "West Water Ditch," Mariposa, California, May 8 and 25, 1894, no. 117 (type); same collector, west side of Mariposa Valley, May 10, 1903.

Type U. S. National Herbarium no. 265776.

Related to *C. macrocarpa*, but differing in its very pubescent ovary, pubescent fruit, and its decidedly lilac-colored flowers.

Cogswellia sonnei (C. & R.) Jones, loc. cit, 34.

Cogswellia suksdorfii (S. Wats.) Jones, loc. cit. 32.

Cogswellia tomentosa (Benth.) Jones, loc. cit. 35.

Cogswellia torreyi (C. & R.) Jones, loc. cit. 35.

Cogswellia triternata (Pursh) Jones, loc. cit. 32.

Cogswellia utriculata (Nutt.) Jones, loc. cit. 34.

Cogswellia vaginata (C. & R.) Jones, loc. cit. 34.

Cogswellia vaseyi C. & R.
Lomatium vaseyi C. & R. Contr. Nat. Herb. **7:** 216. 1900.
Cogswellia caruifolia vaseyi Jones, loc. cit. 41.

Cogswellia watsoni (C. & R.) Jones, loc. cit. 33.

LOMATIUM PURPUREUM A. Nelson, Bull. Torr. Club **28:** 226. 1901, is based upon material which we had referred to Pseudocymopterus (Monograph 188). We have had no opportunity to examine it, and append it as a possible Cogswellia.

APOGAMY IN THE MAIZE PLANT.

By G. N. Collins.[a]

The behavior of some of the varieties of Indian corn, from Mexico and Central America, with which the Department of Agriculture is experimenting, exemplifies the tendency of plants to develop abnormally when placed under new and unusual conditions. Among the large number of abnormalities which have come under observation a case of apogamy appears worthy of special mention, since this phenomenon seems not to have been reported in *Zea mays*.

The abnormality here described was first observed by Mr. R. M. Meade at Victoria, Texas, in a variety from Tuxtla Gutierrez, Chiapas, Mexico. Briefly described, it consists in the production of branches or young plants in the place of the spikelets of the male inflorescence or tassel. Of this variety, which was grown only at Victoria, practically all the plants exhibited this character in a greater or less degree. In other varieties, both at Victoria and elsewhere, a few individual plants were subsequently found that showed a tendency in this direction. The production of these apogamous plants is doubtless a manifestation of the excessive vegetative growth shown by most of the tropical varieties of corn when grown for the first time in the United States. While not as prevalent as the branched ear, staminate flowers in the ear, and other common eccentricities, these apogamous inflorescences are still of sufficiently frequent occurrence to indicate a definite tendency which if properly interpreted might throw light on the development of the corn plant.

Plants with this peculiarity have the tassel unusually large. The lower spikelets are replaced by small plants or branches, many of which have leaves 20 cm. long. The first leaf of these young plants or branches is undoubtedly a transformed outer glume. Though considerably enlarged, in some cases 20 mm. long, it is still easily recognizable as a glume. The next organs are similar to the early leaves of normal corn plants. Following 7 or 8 of these leaves a terminal female inflorescence can be made out, in most cases distinctly 8-rowed, but in some cases with 4-rowed branches after the manner of the monstrous ears occasionally produced at the ends of basal branches or suckers.

In passing upward from the base of the tassel the leaves of these abnormal branches gradually decrease in size, and about midway on the tassel there is only a rather unusual development of the lemma (flower-

[a] Bureau of Plant Industry, U. S. Department of Agriculture.

ing glume) and palet, these inclosing normal stamens. At the tips of most of the branches of the tassel the spikelets are normal. While there is a gradual reduction in the size of the branches (see Pl. LXXXV) there is a very abrupt transition from the last of the pistillate inflorescences to the male flowers with three apparently normal stamens. It would seem from this that the abnormality is not due merely to a gradual transformation of the individual floral primordia into leaves (phyllody), but rather that a change affecting the entire bud takes place early in its history, causing the young bud to develop as a branch or young plant instead of producing a normal staminate spikelet. Furthermore, the number of primordia required for one of these growths is vastly greater than the number required in a normal spikelet.

That the inflorescences that terminate these branches or plants should be pistillate is to be expected from their position on the upper part of the plant. Branches from the lower nodes of ordinary plants are the so-called "suckers," which terminate in staminate inflorescences. Branches from the nodes farther up have the terminal inflorescence pistillate, forming the ears, while branches from the intermediate nodes, below the normal ears, usually bear terminal inflorescences that contain both staminate and pistillate flowers.

In the axils of the first leaves, which correspond to the outer glumes, small roots could be seen (see Pl. LXXXIV), and when separated from the tassel and placed in the ground these apogamous plants took root and made considerable growth. Though none lived to maturity, they continued to grow in an apparently normal manner for nearly two months and produced roots over 1 foot in length.

The production of roots enabling these branches to maintain an independent existence would seem to make this a true case of apogamy similar to that in onions, *Agave vivipara*, and the Arctic species of saxifrage. It would only remain for these apogamous plants to effect a natural separation from the parent plant to make the agreement perfect.[a]

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[a] The definition of apogamy given by Winkler in his "Parthenogenesis und Apogamie im Pflanzenreiche," as reviewed in Nature for March 18, 1909, would seem to exclude all observed cases. The definition is given as follows: "Apogamy is the apomictic formation of sporophytes from vegetative cells of the gametophyte."

Apomixis is previously defined as the production of a new individual not preceded by fusion of nuclei. Hence apogamy is restricted to the formation of a new individual with cells containing the double number of chromosomes (sporophytes) from cells containing the single number of chromosomes (gametophytes) without any union of nuclei.

Even Yamonouchi's case of a plant of *Nephrodium molle* developing from the prothallus and retaining the single number of chromosomes could not be included, since Leavitt's interpretation of this phenomenon as a case of homœosis seems well taken and the plant can hardly be considered as a sporophyte.

It seems desirable to retain the term apogamy with its more general application to cases where a new plant is produced asexually from tissues which normally give rise to sexual organs.

YOUNG PLANTS AND SPIKELETS OF APOGAMOUS MAIZE.

BRANCH OF TASSEL OF APOGAMOUS MAIZE.

While these young plants, being produced in the place of regular sexual organs, may properly be called apogamous, yet the phenomenon is closely related to the common forms of asexual reproduction, particularly to that observed in some of the small varieties of maize that produce ears at the surface of the ground. Several such cases have been observed in which roots were developed on the lower nodes of these ear-bearing branches and the ear was able to continue an independent existence after the main plant was dead, the husk leaves acting as assimilating organs. This, it will be noted, exactly parallels the present example even to the pistillate terminal inflorescence, the only difference being that of location.

The development of these apogamous plants seems to prove that even the most highly specialized organs of the corn plant still retain in latent form the characters of the other parts of the plant.

EXPLANATION OF PLATE LXXXIV.—Young plants and spikelets from the tassel. Roots can be seen on the larger plants. Natural size.

EXPLANATION OF PLATE LXXXV.—Branch of tassel showing gradual transition from young plants to normal spikelets. Natural size.

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[a] The catalogue of the botanical library of John Donnell Smith (pp. 1 to 94) is arranged alphabetically by authors and is not further indexed.

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ERRATUM.

For the combination *Bergerocereus emoryi* (Engelm.) Britton & Rose, printed by error in the text (p. 435), the authors here substitute **Bergerocactus emoryi** (Engelm.) Britton & Rose.